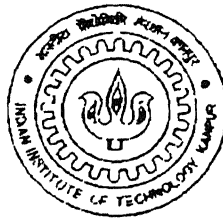


ENVIRONMENTAL IMPACT ASSESSMENT OF INFRASTRUCTURE PROJECTS WITH SPECIAL REFERENCE TO ROAD SECTOR IN INDIA

A Thesis Submitted for the Partial
Fulfillment of the requirement for
the Degree of

MASTER OF TECHNOLOGY



by

Prakash Lachhwani

to the

**Environmental Engineering and Management Program
Department Of Civil Engineering
Indian Institute Of Technology
Kanpur
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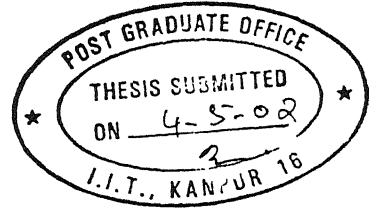
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This is to be certify that the work contained in the thesis titled "*ENVIRONMENTAL IMPACT ASSESSMENT OF INFRASTRUCTURE PROJECTS WITH SPECIAL REFERENCE TO ROAD SECTOR IN INDIA*" by Mr. Prakash Lachhwani (Roll No. Y011711) has been carried out under my supervision and has not been ~~not~~ submitted elsewhere for a degree.

May 4, 2002

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To

My Late Father

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Abstract

Throughout history in the developed world, transportation infrastructure has played an important role in supporting the economic development of communities. Safe and efficient transportation systems are vital to developing countries to provide boost to their economic development. Transportation plays a key role both in the region's capacity to participate in the global economy and in the well being of its communities and people. Transport infrastructure sector, the highway sector promotes speedier flow of inputs and outputs, which are necessary for promoting industry and agriculture.

Like many developing countries, India has fallen short in supply of roads as compared to the demand, especially in the key trunk routes and more importantly, the quality as well as the carrying capacity of major arterial routes pose severe bottlenecks in the swift movement of goods as well as the people.

The present study attempts to project the existing bottlenecks in the Indian road infrastructure and has identified that heavy resource crunch is one of the main bottleneck due to which the previous assets created at huge investment have been left to deteriorate severely which implies further loss to the nation. The various aspects and risks involved with privatization are also explored with the help of EIA studies.

As reported in the literature, the EIA process has been conceived to consist of three steps namely, impact identification, impact prediction and impact evaluation. While the impact identification step is simple and relatively well defined and practiced but the impact prediction and impact evaluation has been the subject of discussion with conflicting view points for several of the development projects. As observed from the analysis of the few EIA reports that the evaluation part for the environmental attributes is easily put into the question as no exact guidelines are reported in the standards published. The available guidelines do not specify any scale and criteria for importance on which the impacts can be analysed. Hence, it would be necessary to standardize the procedure by

evolving the new methodology that can be followed to assess the probable impacts quantitatively and on a weighted scale

In view of the emerging R&R issues associated with development projects in India those issues increasing importance in infrastructure projects. In the road project as they are having long length of corridor in terms of impact generation the numbers of the people affected by them are significant. Unfortunately, the best site for road development (flat and stable) is also tends to be ideal for agriculture. Through the literature review and the questionnaire, it was apparent that there are many occasions where the R&R process fails. The need for the National R&R policy is also emphasized in the study.

This Study suggests that solution to remove the existing bottlenecks in Indian road infrastructure lies in the privatization in the form of BOT. In which the risk should be allotted optimally between government and private party in addition to that physical concessions, tax incentives, one-window timely environmental clearances and guarantee for the minimum expected returns from the traffic should be provided to the investors.

The study, attempts to develop a representative methodology for conducting EIA studies of the road project that could overcome the shortcomings and limitations of evaluation aspects of EIA's. The suggested representative methodology can work as a standard for the quantification of the impact so that the uniformity can be ensured between different EIA studies through standardization of the evaluation procedure the subjectivity in the EIA's can be reduced so that the produced results are easy to replicate in future.

By undertaking the case studies of the two road projects, Vadodara- Halol Toll Road (VHTR) project in Gujarat and Sikandra- Khaga Road (SKR) project in Uttar-Pradesh attempt has been made to highlight the present practice of R&R policies and the various issues concerning R&R. The social concerns and impacts have been identified with a view to suggest Remedial Action Plan (RAP). The methodology adopted includes

extensive interaction with the local population in the area including PAP's, commuters and project authorities

The study found out that the VHTR project in Gujarat had done better R& R as compared to the SKR project which is due to the privatization. The study suggests that assured timely payment of compensation considering the replacement cost not the market value should be given to the PAP's. The benefits to the local villagers should also be considered like enhancement in the basic amenities & safety. R&R should ensure that the standards of living of the affected persons is at least restored to the pre-project level and preferably improved above the levels they enjoyed before the implementation of the project.

Chapter 1: INTRODUCTION AND THE OBJECTIVE OF THE STUDY

1.1 Introduction:

The economic and social infrastructures like road network, transport, irrigation, electricity, drinking water is central to lifting an economy's potential to grow. It is almost a tautology to state that a modern economy only develops with economic and social infrastructure and well functioning institutions that set the rules of the game for economic and social exchanges. The productivity gains that are at the heart of poverty reduction strategies depend critically on efficient provision of these three forms of infrastructure. The key challenge is how to manage infrastructure provision in such a manner that the resultant growth is socially inclusive or what is often called pro-poor growth.

Deficiencies in economic infrastructure create a wedge between realized growth and potential growth of an economy and often the victims are the poor. Innovative approaches to providing efficient and affordable infrastructure will not only integrate the poor with the markets; the growth itself would be accelerated. Finally, in addition to direct economic gains, improved access to physical infrastructure reduces the vulnerability of the poor to natural disasters and enables them to better manage risks to their livelihood.

The synergistic role is relatively straightforward in the case of social infrastructure. We all recognize the critical role that education and health services play in raising the productivity of poor people and in enabling them to participate in the growth process.

In the case of India, recent research points to the notable role of literacy in enabling the poor to benefit from an expanding non-farm economy.

The differential performance of Indian provinces in reducing rural poverty by expanding the non-farm economy is substantially explained by differences in literacy rates

Innovative and sensible approaches to infrastructure provision are needed to maximize the strong synergies in enhancing the potential for long-term sustainable growth and empowering the poor, the twin goals of development economics

For economic growth to be viable in the long-term, considerations of environment and social cohesion must be integrated in the growth strategies. There are countless examples from the Asian development experience that point to the need to include environmental and social factors in building up long-term economic growth potential.

Public-private partnerships in infrastructure provision and an appropriate regulatory environment supportive of competitive pressures could play an important role in ensuring that infrastructure is affordable and of acceptable quality.

It is a part of the tertiary sector, which helps the promotion of both primary as well as secondary sectors.

Infrastructure includes (World Bank, 1994)

- Public utilities - power telecommunications, piped water supply, sanitation and sewerage, solid waste collection and disposal, and piped gas.
- Public works – road and major dam and canal works for irrigation and drainage.
- Other transport sectors –urban interurban railways, urban transport port and waterways, and airports.

The adequacy of infrastructure help determines one country's success and another's failure –in diversifying production, expanding trade, coping with population growth, reducing poverty or improving environmental conditions. Good infrastructure raises productivity and reduces production cost, but it has to expand fast enough to accommodate growth.

1.2 Importance of Infrastructure in Economic Development

Throughout history in the developed world, transportation infrastructure has played an important role in supporting the economic development of communities. Waterways, railways, interstate highways and international airports have all contributed to the evolving traditional transportation media for moving atoms (people, materials, goods etc.) from place to place. In fact, a community's relative proximity or access to traditional transportation infrastructure could mean the extreme difference between economic prosperity and growth, or isolation and economic decay. There are numerous documented examples of this direct relationship between traditional infrastructure investment and economic growth.

In traditional economics, infrastructure referred to tangible assets that often combined characteristics such as economies of scale and externalities. Decades of development experience have taught us that the infrastructure underpinning of economic activities extends much beyond this. There is a wide range of institutions that play a decisive role in shaping economic and social development and ensuring that economic growth is sustainable in the long-term. Economic and social infrastructure provides the tangible foundation for economic development.

The adequacy of infrastructure determines a country's success and another's failure – in diversifying production, expanding trade, coping with population growth, reducing poverty or improving environmental conditions

Safe and efficient transportation systems are vital to developing countries continued economic development. Transportation plays a key role both in the region's capacity to participate in the global economy and in the well being of its communities and people. Transportation is about more than concrete, asphalt, and steel, it is also about providing people with opportunity, freedom, and community.

1.3 Significance of Transport Sector as well as the Road Sector

The linkage multiplier effects of transport sector are very high. It provides boost to primary agricultural and industrial sectors of an economy. Effective transportation is indispensable to economic progress. Agriculture, mining, manufacturing, trade and banking are necessary for higher economic development, but promotion of these activities, like many others primarily depends on the state of development of tertiary activities like roads and transport systems. Without adequate facilities for moving goods and people from place to place, economic and social activities can only be carried out in a limited way. Using a mobility index that combines available data on transport facilities and movement of passengers and freight, Wilfred Owen found out that immobility and poverty go together.

This study had shown that the countries with low per capita income had a mobility index for freight and passenger transport in single digits, whereas this index was significantly high in countries with high per capita income.

Indeed, a more recent study (Puri, 1991) finds out that every one-percentage growth in the Indian economy presumes a growth of 1.2 to 1.4 percent growths in the transport sector.

The recent study of Rath, et al. (2001) has established that road and transport sector holds the key to the growth process of the economy of Uttar

Pradesh It is identified as one of the chief drivers for the state domestic product (SDP) growth of Uttar-Pradesh

Economic Functions of Transportation

Transportation performs the following economic functions Along with other productive factors, it facilitates the production of goods and services in the economy

In modern world, transport along with energy is the basic infrastructural requirement for industrialization Transport system and road network are vital for movement of inputs, raw material to the plant sites and again for the movement of goods and services produced by the industries to the market centers. In fact, these facilities always provide a "Big push" for industrialization of any backward area. Hence the developing countries have accorded it an important place in their programmes of economic development

Transport provides a vital link between production centers, distribution areas and the ultimate consumers. It also exercises a unifying and integrating influence upon the economy

An efficient transportation system is considered as the backbone of any country's economy and essential to the quality of people's lives Maintaining the level of mobility enjoy today while accommodating growth throughout the region is a challenging task.

"Transportation creates the utility of place, and to a lesser degree, that of time."

An increase in efficiency of transportation helps in reducing the cost of producing goods and thus reduces their prices. Cheaper transportation has both direct and indirect effects on cost of production. Directly, reduction in transport rates laid to overall lower production costs by lessening the outlays

for assembling raw materials and shipping finished products by reducing the expense of travel. Indirectly, cheaper transportation tends towards lower cost of production by making possible more efficient extraction and manufacturing, through promoting the division of labour and large-scale production.

Promotes specialization and division of labour

Owing to growth of the transport systems, now it is possible for products to be brought and sold at great distance, thus avoiding the necessity for local production for all conceivable commodities of need. The growing demand of product of different locations, the specialization and the associated division of labour are being encouraged. In view of advantage of easy flow of goods and services from one part of the country to another and even between countries, these can be regional specialization. Each economic region can thus concentrate upon the goods and services for which it is best adapted either through natural resources endowment or through historical development. It thus, leads to a better economic use of available resources.

Encourages Large-scale marketing

Closely associated with the foregoing is the fact that transportation helps to expand the size of market. No modern large-scale producer could operate if he will to serve only the local market. Obviously, a large-scale production is possible when the market extends to the whole nation and in a few cases to the whole world.

Encourage consumption

Since advertisement as well as movement of goods and services are facilitated by the transport system thereby, the wants of the consumers are satisfied. Those increases in consumption promote more production moreover the decrease in the cost of production brought about by transportation also induces more consumption. A greater variety of consumption occurs because

transportation enables a community to enjoy even those goods that could not be produced in the immediate vicinity.

Social and Political Functions of Transportation

Transportation performs many social and political functions. Transportation raises the standard of living, making possible improved housing, clothing, food and recreation. It helps break the barrier of isolation by promoting social interaction and thus promotes culture and intelligence, specially in a country of the size and population of India. It promotes national unity in that it promotes homogeneity among the people. Another reason is that it creates a need for political unity, by making the different parts of the country economically interdependent. It helps in the strengthening of national defence. Transport is an important agency that helps in the mobilization of the entire resources of a country in the event of war and peace.

More and more people are living in urban areas and these are getting larger especially in the developing countries. Greater economic activity is increasing demand for transport and the wealth that this creates results in higher use of cars, vans and trucks. In turn this leads to congestion especially on roads, which causes economic costs and environmental damage. In the longer run increased use of private transport encourages more dispersed settlement patterns which require more energy to sustain, consume valuable land, produce more pollution and are more difficult to serve by public transport. As this cycle turns it leads to less and less sustainable urban transport systems.

1.4 Transport Sector and the Economy

Economic Impacts

Economic impacts of the transport are measure in terms of primary and secondary effects of capital expenditure on any activity on regional economy. These effect flow in the form of income, employment and production, generate tax revenues and also in the form of additional consumption. The primary effects are broadly categorized into the following three types.

Direct impacts are the consequences of economic activities carried away on the site of the construction and operation road network. Employment of labour, purchase of goods and services, and taxes paid are examples of activities that generate direct impacts. The use of newly constructed road by vehicles is also a source of direct impacts in the form of fuel saving and time saving.

Indirect impacts are derived primarily in the form offsite economic activities associated with production of immediate goods and services required for the construction and operation of the road. Some of these activities include services provided by the consultants, by the procedure of aggregate, asphalt, steel, and concrete etc. Due to the higher demand of these inputs, the production enterprises employ more labour, purchase goods and services and use more resources, those generates economic activities

Induced impacts are the multiplier effects of the direct and indirect impacts. As income expands because of the direct and indirect effects, household increase their purchase of goods and services, thereby giving rise to still further changes into production and corresponding changes in other impact variables. For example, most of the wages earned by the construction worker is spent in the region. Some of this spending becomes income to individuals who provides goods and services to the construction crews and

also for local business and their employees. As successive rounds of spending is occurred, additional income is generated in the economy.

1.5 Linkages Between Transport and Road Sector

Roads are necessary complement to all forms of transportation like waterways and railways. India is country of villages and it is only roads, which can connect villages, Railways can connect towns. The railways station will have to be properly served by the network of feeder roads. Only through this roads the railways can receive passengers and goods. If railways are necessary for the movement of passengers for the long distances, road transport is essential for such movements for short distances. Road and railways are, therefore, not competitive but complementary to each other.

Road transport is particularly advantageous to the farmers. Good roads help the farmers to move their produce, particularly the perishable products, like vegetables, milk, egg, fish etc. quickly to the mandis and towns. Only by developing the road system, the farmers can be assured of the steady market for his products. This assumes great important in the context of the green revolution in India. It is important to recognize that it is the road system which brings the villagers into constant touch with the towns and the new ideas and the new systems which emanates from the towns.

Roads are highly significant for the defence of the country. In the vast country like India, it is necessary that troops should be moved quickly from one place to another in times of emergency. The railways are useful here, but more important then the railways is the road transport. Now a days the army has to move its troops, its tanks and armed cars, its field guns and so on, for the movement of these facilities, roads are essential. Railways and roads are

complementary to each other much more than other modes of transport and mutually helpful

The road systems links production base with the local market and the nearest railway station. The railways on the other hand, provides the connection links between the areas of production and a consumer at a distance and between the manufacturer in the town and the cultivators in the village. The railways cannot collect for transport enough produce unless there are good and sufficient roads.

At the same times, facilitates the producers of iron, steel, cement, coal and other bulky commodities to move to the markets of end-users.

1.6 The Objectives of the Study

The principal objectives of this study are set as follows

- 1) To examine the scope of Privatizing Road Infrastructure in India
- 2) To analyze the methods of financing the road sector projects.
- 3) To scrutinize the various EIA methods adopted in road sector
- 4) To develop a representative model for road projects
- 5) To predict the nature, magnitude and importance of probable impacts of highway projects quantitatively.
- 6) To suggest the measures to mitigate the adverse impacts, where ever necessary.
- 7) To study the R&R practices adopted in road projects in India.
- 8) To suggest some policies changes to improve the R&R practice in road projects

1.7 Methodology and Approach of the Study

To achieve the above listed objective the study is organised into two phases. In the first phase, the secondary data is collected from the various

institutions, central agencies like MOST (Ministry of Surface Transport), National Highway Authority of India (NHAI) and MOEF (Ministry of Environment and Forest) and the work of the various researches are studied and the secondary data are also collected from the various research works and EIA reports. This data is collected in suitable format and then analysed. The result obtained from this exercise is verified in the second phase, in which some field studies are also conducted for primary data collection. The field study includes the Vadodara- Halol toll road in Gujarat and Sikandara-Khaga (NH-2) Four-laning project in Uttar Pradesh, in which the former is the completed project and the latter project is in progress.

1.8 Structure of the Thesis

The study is divided into seven chapters. To start with, Chapter 2 studies the road development in India. It describes the present situation and various issues involved in the development of road infrastructure in India with the challenges ahead. Chapter 3 explores some views on the development of road infrastructure through private financing. The various constraints involved in the private sector funding and how to overcome them are discussed in detail. The concept of the BOT is studied in detail. Privatization with focus on the BOT form is also studied and the various issues on the basis of the scheme being floated are addressed. Chapter 4 examines the concept of Environmental Impact Assessment, in which the process and the various methodologies used are documented and the EIA practice in India is discussed, addressing the various issues in the Implementation of the EIA. The various impacts from the road projects are also discussed in detail in this chapter. This chapter also suggests a new representative methodology for the environmental impact assessment of the highways. In which the attempt had been made to quantify the various environmental attributes and based on that selection between the alternatives can be done. Chapter 5 examines the various aspects involved in

displacement due to development projects in the contrast of road sector projects and the present R& R measures adopted for road projects in the India

In the chapter 6, the R& R issues are studied for road projects in light of two case studies Further, in the concluding chapter 7, the conclusions and policy implication of the study are presented in which the attempt has been made to suggest some changes in the present practices of R&R of road projects

Since all research work give rise to new ideas and alternative possibilities, this work too have a scope for the future research work, which are equally challenging and thrilling These are explored in the concluding chapter

Chapter 2: ROAD INFRASTRUCTURE AND ROAD SECTOR IN INDIA

2.1 Road Infrastructure in India

In order to provide better governance in terms of movements of goods and services the production centers to the end- users, movements of Army personals as well as other law and order authorities, the state has always focused on development of the road and transport infrastructure. History shows Sher Shah Suri had constructed the Grand truck road from Peshawar to Dacca. The Mugal emperors and the Britishers had also accorded priority to construction of roads, railways and waterways for improving their administration. In view of the importance of the road and transport infrastructure the Government of India too had focused on promoting road network, railways, waterways. Successive five-year plans have allotted more and more funds for promoting these infrastructures. Owing to these efforts, now India has one of the largest highway and road networks on the planet, second only to the road network of the United States. The total length of roads in the country exceeds 3.01 million kilometers. The break up of which is given below

National highways	52,000 km
State highways	128,622 km
Informal network	2, 737,080 km

This labyrinthine network consists of 52,000km of national highways, 128,622 km of state highways, and an informal network running to an astounding 2,737,080 km.

Road Network in India

With the view of efficient management and better administration of the road network it is divided into the following categories

- ♣ National Highways
- ♣ State Highways
- ♣ Major District Roads
- ♣ Minor District Roads
- ♣ Village Roads

The National Highways are managed by central government under central budgetary grant. Other than the National Highways, all other roads are managed by the state governments. While the state highways, major and minor district roads are managed by Public Works Department (PWD) of the state; the village roads are managed through Panchayatraj Institutions.

Table 2.1 Allocation of funds for development of National Highways (Ramakrishnan, 1995)

Year	Funds Rs. Crores
1950-1951	02
1955-56	10
1960-61	10
1965-66	29
1970-71	22
1975-76	56
1980-81	100
1985-86	214
1990-91	390
1991-92	416
1992-93	458
1993-94	560
1994-95	633

The amount spent for the development of National Highways since 1947 to 1995 has been Rs 5550 Crores and the amount spent for maintenance of these roads have been 2000 Crores

An examination of the traffic flow on the roads shows that India's 52,000 km of national highways account for 16 percent of the total road network carry over 40 percent of the road traffic. Since a large part of the national highways are two-lane roads or narrower, leads to serious traffic congestion. Through the government's strategy for the road sector in previous decades had focused on rapid expansion of rural connectivity at the expense of the core highway system, the maintenance of highways was very poor. The poor road conditions lead to high prices, high transport costs, travel delays, and high accident rates. Thus the government realised that the roadworthiness of India's growing vehicle population depends to a large extent on the quality of India's 3.1million-km road network. Poor road surface causes tyres and other components to wear out faster and there is increased fuel consumption on account of congestion and traffic snarls it (Sinha, 1997).

The deficiencies were identified as 4-laning of existing 2-lanes, construction of bypasses, reconstruction/rehabilitation of damaged bridges, provision of wayside amenities and other activities. At present about around 1500 km of existing 2-lane highways are over-crowded which actually carry the heavy commercial traffic of 30-40 thousand passenger care units as against the normal capacity of 15-20 thousand PCUs. Insufficient allocations continuously for past few decades both for construction and maintenance have resulted in fast deterioration of the roads, excessive vehicle damage and great loss of travel time as the average speed is less than 25km per hour as against the normal speed of 50km per hour for trucks, besides a large number of road accidents in one of the highest in the world. The main reasons are insufficient road capacity, overloading of trucks 1.5 to 2.0 times the permissible load

Mixed traffic pattern, encroachment, inadequate safety measures and loose administrative controls. The present condition is really pathetic. Therefore the most immediate need is to augment the road capacity which is possible by (Road Wing), Govt. of India widening of the existing high density National Highways corridors whenever physically possible in shortest possible time.

The government addressed these issues by increasing allocations for construction and maintenance and also increasing the emphasis on the role of the private sector. Efforts are being made to improve the existing National Highways not only by strengthening and rehabilitation of existing assets but also by constructing new roads and bridges over missing links, improvement of low grade sections and widening to 4 lanes. The work of modernization of the system through construction of some Expressway is also in progress.

2.2 The Emerging Challenges to India's Road Infrastructure

The country's road system cannot be measured in terms of its length alone. The quality and the level of services provided by the roads are equally important. It is here that the emerging picture is very dismal. The roads in India are under designed, under constructed and under maintained. Nothing else sums up the status of India's road network. The inadequate road pavement, road thickness, poor road surfaces quality, old and fatigued bridges and culverts, existence of number of railway crossings inhibiting smooth traffic flow on highways, absence of bypasses to relieve road traffics from city congestion and the absence of road side amenities are the major problems that continue to dog the road infrastructure (Puri, 2001).

Only about 5 percent of the national highway is four laned, 80 percent two laned and 15 percent single laned. The commercial vehicle can run only 200-250 kms per day instead of around 600 kms in developed countries (Puri, 2001).

Government of India had constituted an expert group in October 1994 under the chairmanship of Mr Rakesh Mohan, Director General National Council of Applied Economic Research to give suggestions on Commercialization of Infrastructure projects (including road projects) The Group submitted its report in June 1996 and listed the following deficiencies in road network

Table 2.2 Fund Requirement for Removing Deficiencies in Network

Work	Length (km)	Cost (Rs.Million)	Cost US \$ Million
Programme on existing National Highways			
1 Lane to 2 Lane & strengthening	5,200	52,000	1,238
2 Lane to 4 Lane	14,000	420,000	10,000
Pavement and shoulder up-gradation	15,000	90,000	2,143
Bypasses	14 Nos.	20,000	476
Bridges	470 Nos	10,000	238
Safety & Misc.	Lump Sum	50,000	1,190
TOTAL (A).		642,000	15,285
Proposed Expressways (B)	2,000	160,000	3,809
Total (A)+(B)		802,000	19,094

Because of these dearth of the funds, this sector faces many problems, the previous assets created at huge investment have been left to deteriorate

Because of these dearth of the funds, this sector faces many problems, the previous assets created at huge investment have been left to deteriorate severely which implies further loss to the nation by the way of high users cost. It has been estimated that direct economic loss to the country due to bad condition of roads is of the order of Rs 30,000 crores annually apart from the opportunity cost, environmental cost due to pollution caused by congestion and accident/ safety cost.

2.3 Main impediments in the Development of Roads in Our Country

1) Low plan period funding:-

The roads sector has been progressively under funded in successive five-year plans. In absolute terms only a sum of Rs 7 billion per year was available for development works on national highways and a meager Rs 2.25 billion for maintenance in FY96.

Table 2.3 Funds for Transport /Road /Highway Sector (Ramakrishnan, 1995)

Plan	Transport Sector %	Road Sector %	National Highways %
1 st plan	24.5	6.5	1.43
2 nd plan	27.1	5.5	0.82
3 rd plan	18.6	4.0	1.53
4 th plan	10.2	5.5	1.40
5 th plan	13.8	3.5	0.84
6 th plan	12.4	3.5	0.84
7 th plan	12.6	2.9	0.67
8 th plan	13.1	3.0	0.58
9 th plan	14.2	3.3	0.64

2) Serious traffic congestion: -

India's 52,000 km of national highways account for about 1.6 percent of the total road network of 3.3 million km but carry over 40 percent of the road traffic. All but 500 km of the national highways are two-lane roads or narrower, leading to serious traffic congestion.

Road transport density in India would indicate the status position in 1951-1999. The road transport in the decade 1981-1991 had a quantum increase from 54 Lakhs to 214 Lakhs jump of 4 times. The density of vehicle per Lakhs of population has increased from 789 to 2526 a jump of nearly 3 times. Out of 22 Lakhs KMs nearly 14 Lakhs KM or 66% are of village/normal roads, majority of which may not suit to heavy transport movements.

Table 2.4 : Road Transport Density in India (Dhir et al, 1996)

Year	Vehicle population in lakhs	Road length in lakh kms	Human population in Lakhs	No of Vehicle/100 Kms of roads	No of vehicle /1lakh of population	Road Density in km/sq km
1951	3.06	3.99	3611	77	85	0.12
1961	6.65	5.25	4392	127	151	0.17
1971	18.65	9.18	5462	203	340	0.28
1981	53.61	14.89	6833	362	789	0.45
1991	213.74	21.40	8463	899	2526	0.63
1993	252.99	22.00	8733	1150	2897	0.66

3) Inappropriate Govt. strategy -:

The government's strategy for the road sector in previous decades has focused on rapid expansion of rural connectivity at the expense of the core highway system, and did not provide adequately for maintenance. This has come at a price, namely high transport costs, travel delays, and accident rates.

4) High transportation cost:-A study estimated that-

Table 2.5 High transportation cost (NAHI)

(i) Present vehicle operating cost	100,000 crore
(a) National highways	40,000 crore
(b) State highways	60,000 crore
(ii) With good road network estimated saving	15,000 crore
(a) National highways	6,000 crore
(b) State highways	9,000 crore
(iii) Saving in fuel consumption	22,500 crore

2.4 The Issues Involved in Road Sector Development

In any country, the roads play a key role in the development of the nation. Roads are required for transportation of a large population, movement of natural resources, raw materials and finished goods to and from one place to another. The development of the all sectors of economy, such as, Agriculture, Power, industry, mining etc depends on road network. The social activities, such as, Education, Health, tourism etc, also depends to a large extent on transport. Road network also helps in integration of remote and inaccessible parts of India with the mainland.

Road projects typically have a low financial rate of return. However, the economic return to communities from such road development is substantially higher. This is mainly due to the many positive externalities that accompany road projects. These include increases in the overall efficiency of the economy and its rate of growth as well as increases in the value of land surrounding the road. These benefits, however, are usually difficult to measure and price since they accrue to the community as a whole. Only the Government can capture some of this value through an increase in the productivity of the economy and the consequent increase in tax revenues. Consequently, the Government needs to play a dominant role in the creation of road infrastructure.

Three 20-year road development plan, i.e. plans for period 1941-1961 (Nagpur plan), 1961-1981 (Bombay Plan), and 1981-2001 (Lucknow Plan) have laid the foundation of growth of road network and agenda for future. The finalisation of 20-year plan for the period for 2001-2021 is underway.

2.5 Scope of Public-Private Partnership in Road Development

The recent economic reforms and the agenda of the government adopting progressive innovative practices for sustained growth deregulation, debureaucratization has thrown the restricted policy norms and have allowed the flood gates for multinational, Non Residents Indians and Private entrepreneurs (Ramakrishnan, 1995)

To participate as Joint Venture or consortium under privatization concept These companies can invest their funds in creating highway facility, who may be granted concession to levy toll for use of the facility and recoup the amount invested with a fair amount of profit margin for a certain number of years, after which the facility would transfer back to the government

The government will have to provide the land free encumbrances and utility services Thus at lower investment by Govt. the facility could be available.

Chapter 3: ROAD INFRASTRUCTURE FINANCING AND PRIVATE SECTOR PARTICIPATION

3.1 Main features in Infrastructure Funding

The infrastructure projects have the following special features (Jain, 1997) -

- The projects require large capital costs relative to maintenance and operating cost.
- Sunk costs are very high; a large proportion of the cost has to be irrevocably committed upfront before the project becomes operational
- The gestation period is long and returns are slow to pour it
- The services produce by the infrastructure projects has limited tradability. The excess services generated by few cannot be stored and exported and the deficiency in the service cannot be met by imports except for certain exceptions.
- The availability of foreign funds is poor as returns are usually shared in local currencies. Repayment of funds received from across the border is further subjected to government regulations.
- The sector is sensitive to political environment and policies changes.
- It is difficult to charge the economic cost of services from the users, thus most of the infrastructure projects fails to achieve economically viability.

3.2 Method of financing

3.2.1 Private Sector Financing

The public sector has historically been the provider of the basic transport infrastructure like roads, railways, ports, airports and pipelines. It has performed this role in the past as well. But as transport demand grows at a faster rate and technological obsolescence takes place rapidly, the public sector finds itself enmeshed in a resource crunch. Therefore, there is a need to develop new strategies for overcoming the transport tangle. In this context privatization of transport infrastructure has become an imperative. Many countries have already embarked on privatization possibilities and many more are seriously considering this option. Some of the main reasons of privatizing road infrastructure are (Charlile, 1994) -

- i) Privatization offers alternative source of financing, when funds from the Government's budgetary allocation are inadequate.
- ii) Privatization cuts time overruns and cost overruns, which are generally associated with public sector projects.
- iii) Privatization brings the innovative concepts and technology.
- iv) Decisions are quicker with private ownership than with Government.
- v) Tolling is an efficient method of charging the actual users of the facility and thus an equitable form of users taxation.

The advocates of privatization further cite six economic related principles as justification for private sector involvement (Gelter & Moarenzaden-1987)

- 1) Increased revenues to the Government, since fuel taxes collected on private road could be utilized on other projects.

- 2) Improvements in the efficiency of the highway usage by making travel less costly
- 3) Improvement in the efficiency of highway maintenance
- 4) Improvement in the quality of the highway services so that private roads are preferred by the drivers
- 5) Introduction in the competition of the development and operation of facilities, with lower operational cost and creative implementation strategies
- 6) Additional incentives for cost effective and cost efficient operation of highways.

3.2.2 Forms of privatization

Privatization of road infrastructure can take many forms such as-

- a) Government owns the facility but allows the private party to operate it; This brings in greater efficiency, smaller overheads and less revenue packages.
- b) Joint ownership of the facility by the government and the private party, and operation by private party
- c) Ownership and operation fully by private party, often under an agreement covering a lease period, and transfer of facility to the government at the end of the lease period.

There are many examples of successful adoption of the above concept in different countries. The basic idea under laying these is structure of management to apply commercial principles of operation, broaden competition and extend the financial sources.

3.3 The concession Agreements: BOO, BOLT, BOT

Table 3.1 Different concepts of available privatization scheme

Type	Description	Application
Build Operate Transfer (BOT)	Provide private consortia with a concession to finance, build, operate and maintain a facility. During the life of the concession investor collect users fees to cover the costs of construction, debt servicing and operations. At the end of the concession, the facility reverts back to a public authority.	The most frequently used technique to develop a country's highway network. Also used in the energy, utilities and port sectors.
Build Own Operate (BOO)	Similar to the BOT scheme but without the transfer of Ownership.	Used successfully in the telecom sector, waste treatment and power plants.
Build Own Operate Transfer (BOOT)	Same as BOT after a negotiated period of time, the project is transferred to the Government.	For highway development, energy utilities and port sector.
Build Transfer Lease Operate (BOLT)	Government provides the right of way on which the highway is built, agreement require the concessionaire to pay a nominal rent for the use of the land.	Applied in Highway and Expressway Development.
Develop Built Operate (DOB)	A relatively new concept in which the project company assures no commercial risk initially, but is financially accountable for building and operating a system as per performance specifications. The company assumes commercial risk incrementally and conditionally as government set up appropriate regulations.	Proposed for utilisation in transport projects.

3.4 Constraints in the Private funding of the Highway Sector

- 1) Long Term Investment – Because of the long period involved in the highway projects, the investors do not perceive it as a profitable proposition to invest for such a long term without getting any returns till the project is completed and people start paying toll etc
- 2) Very high level of traffic is needed to justify the project as a commercial venture. For example, traffic of more than 20,000 vehicles for day on new facility justify the expressway
- 3) Risk Involved -. There are many risk factors involved in undertaking the construction of a road project by private players. These are-
 - a) Traffic forecast accuracy
 - b) Currency fluctuation specially if foreign investments are involved
 - c) Continuation of the privatization policies under changing political setup
 - d) Delay in getting clearances from various government bodies
 - e) Presence of toll-free alternative facility that may deter people from using toll facilities.

3.4.1 Steps to be taken to overcome constraints in private sector funding

(i) Legal Framework

For a privatizing scheme to succeed, there has to be an adequate legal framework under which the entrepreneur is enabled to build, operate and collect users charges. A comprehensive package enabling legislation, covering all aspects, must be there.

(ii) Institutional Setup

A very strong, effective and supportive institutional set-up is needed to make the privatization scheme successful, since the Government is a major player in the venture, it should have necessary expertise to determine what is good for it and what is good to the users of the facility. The private entrepreneurs expect such body to function as a single window clearances for various approvals needed. There should be an effective mechanism for setting disputes.

(iii) Lease Period

Since the transport infrastructure projects entail initial outlays and low returns, the lease period should be sufficiently long. Particularly for highway projects, the period is recommended around 30 years. However for very large projects, the lease period should be 50-60 years.

(iv) Tariff Rates

The users charge that the developer generally levy is theoretically the best left to their commercial judgment. If they charge more than what is reasonable, the clientele will dwindle. But the system of government check and balance is inevitable in all projects. The regulatory system should be supportive of the private entrepreneur rather than being restrictive. For example, as inflation takes places, the private party must be allowed to review tariff structure.

(v) Guarantee

Since the risk involved in transport structure projects are high, some sort of guarantee for the earning is justified. In many of the privatized projects, the government has given some sort of guarantee. That exact nature of guarantee has to be negotiated for each project.

(vi) Transparency in Selection

In order to generate competition and ensure fair play, it is necessary that entire selection process is transparent. The selection criteria must be well laid down and made known to the prospective bidders.

(vii) Reference Solution

There can be many technical solutions for a particular project. The Government must itself carry out a feasibility study and establish a standard or reference solution, laying down the broad technical standards. The bids must be invited with reference to this standard solution. The successful party will, of course, have to carry out detailed engineering subsequently to arrive at more accurate design and costs. The financial agreement will then be based on the detailed engineering designs and costs.

(viii) Government Support

The experience of the private party and the public who may subscribe to public issues is increased if the government participates in the project to some extent. This may take various forms such as -:

- Making land available free of cost
- Participating in the equity
- Giving guarantee regarding recovery of users charges
- Giving guarantee to foreign participants about repatriation of profits in foreign exchange

3.5 Structural Change for Highway Management

The Government of India has introduced a number of structural changes for efficient management of the National Highways. While the maintenance of NH is undertaken by the CPWD, GOI, all new construction and expansion works are undertaken through the Ministry of Surface Transport (MOST). Ministry of Surface Transport has constituted two bodies to overlook the implementation of various road projects in India, viz ,

- 1 National Highway Authority of India (NHAI)
- 2 National Expressway Authority of India (NEAI)

Government of India took a major initiative for capacity enhancement of the National Highways and this foremost task given to the NHAI for implementation of NHDP (National Highway Development Program), which comprises of the Golden Quadrilateral and North-South & East-West Corridors

NHDP's prime focus is on developing International standard roads with facilities for uninterrupted flow of traffic with:

- Enhanced safety features
- Better riding surface
- Better road geometry
- Better traffic management and noticeable signages
- Divided carriageways and services roads
- Grade separators
- Over-bridges and underpasses
- Bypasses
- Wayside amenities

Advantage of having a well-developed networks of world-class highways are many for a nation like India- poised to surge ahead

- Saving in vehicle operating costs
- Faster, comfortable journeys
- Reduced fuel consumption
- Safety travel
- Benefits to trade especially in movement of perishable
- Reduced maintenance costs
- Safer travel
- All round development of areas

In addition to the projects under NHDP, the NHAI is also currently responsible for about 1,000 km of roads connecting major ports & also on National Highways 8A, 24, 6, 45 & 27

The policy guidelines of National Highway's (NH) laid down by the Ministry of Surface Transport and implementation is done by the various state government as well as the NHAI and NEAI

Policy:

Four lane sections (both, budgetary as well as privately funded) to be tolled.

- Toll in perpetuity
- Concession period normally up to 30 years
- Revision of fee linked to Wholesale Price Index (WPI)

- National Highways Authority of India (NHAI) permitted to participate in equity.

Risk sharing:

- Private sector to be compensated for force majeure
- NHAI to provide short-term credit for temporary short fall in revenue due to reduced traffic diversion
- Foreign exchange risk sharing pattern being worked out
- High Powered Committee set up to draw up the BOT terms and risk allocation.
- Detailed Guidelines for BOT projects issued
- Emphasis on transparency, competitiveness and fair contract conditions.

Legislation:

- Road sector has been declared as an industry to facilitate commercial borrowing.
- The Government has amended the National Highways Act, 1956 to provide for the legal framework for private sector participation. Under the amended Act, it is possible to
- Assign to the private entrepreneurs responsibility for implementation and operation of projects for specified period by an agreement with the Government.
- Authorize the entrepreneur to collect and retain the users fee (toll).
- Authorize entrepreneur to regulate traffic on BOT road.

- Punish any person encroaching and misusing the highway developed by the entrepreneur

Tax/Fiscal Concessions:

- Concessions available for enterprise undertaking any project
- Five years of corporate tax holiday and deduction of 30% profits for the purpose of tax during the next five years, to be availed within the initial 12-year period
- Reduction in the rate of import duty in respect of specified construction plant and equipment

Concessions Available for Lenders/Investors

- As an incentive to financial institutions to provide finance for the infrastructure projects, deduction up to 40% of the income derived from financing of these investments is available provided the amount is kept in a special reserve
- Exemption for infrastructure funds from Income Tax on the incomes from dividend, interest on long term capital gains of such funds or companies from investments in the form of shares or long term finance in any enterprise set up to develop, maintain and operate an infrastructure facility.

3.6 International Experience with Highway Privatization

International Experience with privatization has mostly taken the form of toll roads, bridges, and tunnels. Accepting private sector financing in each country is a product of political, cultural and financial condition that are unique to the country. However most of the privatization efforts exhibits some common characteristics. Examining these and learning from their experience

can help in development of a sound privatization scheme in India (Tailor et al, 1995)

Most developed countries have built high performance, access controlled and grade separated expressway systems since World War II. Some relied on motor fuel or general tax revenues for financing these expressways while others relied on toll receipts.

Tax financing predominates in Northern Europe, the US and Canada, whereas toll financing predominates in Southern Europe and Japan. Even if one dominates, some countries have both systems. As an example, although tax financing has been the norm in the United States about 4000 miles (out of the 55000 miles of expressway) are tolled. In France, Spain, and Italy, commuter's expressway are rarely tolled but intercity expressway are. Many countries which once relied on tax financing turned to tolls when inflation eroded the purchasing power of federal and state fuel taxes.

Several South European countries, especially Spain and France have decades of experience with private toll companies. Other countries are experimenting for the first time. Britain awarded its first toll road concession in 1991 for a thirty miles six lane bypass around Birmingham. In the United States, two states, California and Virginia, signed franchise agreements with private companies for five toll roads in the early 1990, and other states have also passed legislation allowing private roads.

Most developing countries have just begun high performance expressways, and many are relying on toll financing and private concessions. Mexico is the typical example. In South East Asia, Thailand, Malaysia and Indonesia followed a similar pattern.

“ Since the dissolution of the Eastern Bloc, Eastern Europe has also increased toll roads

In some cases the privatization is successful only with the active government support which came in the form of provision of funds at low rates, subsidies, tax holidays, legal assurances and guaranteed traffic as well as returns, and so on. Some of the major incentives used to augment the income from the toll roads were (Tailor et al, 1995):

- Granting of land rights to encourage development of ancillary activity to make the project viable, such as shopping center on the Chinese Gangzhoushenzen Super Highway in China
- Allowing private toll road operator to share in the revenues of the existing publicly toll roads, such as the Bangkok second state Expressway, the drafford crossing project in UK and Sydney harbour tunnel project in Australia.
- Offering shadow tolls to private operators, viz, toll paid from government revenues on the basis of traffic flow, as proposed by Australia and UK.
- Setting up of public-private corporation with private sector management to provide guarantee facility to loans made by private financial institutional of selected scrutinized road projects in the case of Japan.

3.7 BOT Roads in the Indian Context

Experience of the developing countries indicates a close relationship between the two major issues in infrastructure privatization i.e.: the need to tap private capital markets and the desire to balance the investors and users interest in designing the schemes. Further, privatization may increase the overall investment in the economy by providing more access to new capital

On the other hand, the regulatory environment is often uncertain and risky in developing countries, making it difficult to attract foreign investors. International investors may be reluctant to invest without government guarantee, as the legal system may not safeguard their interest. These guarantees could be in the form of future toll increase, and assurances that the franchise terms would not be unilaterally altered (Taylor & Bangia, 1995).

Private operated roads are a novelty in India. Financial conditions do dictate that the private sector must play a part in future infrastructure development. The biggest problem will be ensuring that the rules governing toll collection are free from future political interferences. This may prove difficult in a country where many people have come to expect that public services, including transport cost a little or nothing. Simply ensuring that travelers do not ignore the toll booths will be a challenge.

The government has to develop strict regulatory practices to ensure financial austerity and the system is not abused, and no unscrupulous activity takes place.

In addition to these weaknesses, there are some major drawbacks in the scheme being floated-

Rane and Mittal (1995) had identified some major impediments in kicking off the BOT projects, successfully in India.

- No assurances from the government regarding minimum expected returns from traffic.
- Inadequate securities and guarantees from the Government, which hinders raising of finance.
- Lack of coordination between various government agencies.
- Significant expenditure expected to be incurred on ancillary works like removal of infringements, shifting of utilities etc.

- Government not willing to share risk with the private entrepreneur
- High interest rates from government lending agencies
- No additional incentives in the form of tax concessions to the private entrepreneur
- Government insisting on unrealistic time frame for submission of bid and commencement of work.
- Lack of understanding on part of government regarding various financial issues.
- Non-existence of proper Concession Agreement frame on the line of standard Cash Contract Agreement which becomes non compatible with BOT projects.

The recent economic reform and the agenda of the Govt. adopting progressive innovative practices for sustained growth deregulation, debureaucratisation has thrown the restricted policy norms and have allowed the flood gates open for multinational, Non-Resident Indians and private entrepreneurs to participate as Joint Venture or consortium under privatization concept of BOT basis. These companies can invest their funds in creating highway facility and recoup the amount invested with fair profit margin for a certain number of years, after which the facility would transfer back to the government. The government will have to provide the land free of encumbrances and utility services. Thus, at low price, the facility could be created.

3.7.1 Steps in a BOT Projects

There are eight steps in a BOT projects

- 1) In the first stage, a letter of intent be signed between the Government agency and the sponsors.
- 2) A feasibility study of the project be carried out.

- 3) A project company be formed with the shareholders
- 4) In the fourth stage an implementation agreement be signed between the project company and the government
- 5) The fifth stage entails the raising of funds from different sources
- 6) Then construction of the facility is undertaken by the developer
- 7) In the seventh stage, the operation of the facility is undertaken, wherein, the project company collects tolls for covering the debt and a sufficient returns on its investment
- 8) The last stage includes transfer of the facility to the government.

3.7.2 Characteristics of a BOT project

A BOT project involve different forms of partnership

- Between the Government and the project sponsors
- Between the entities that constitute the project sponsor
- Between the project sponsors and the financial institution
- Between the sponsors and the end users

Arrangements involving a specific project company often created for the purpose, which may be typically a consortium of foreign partners, local partners, construction companies, equipment suppliers, service operators and financial institutions.

A BOT project is often subjected to various legal intricacies like

- Land Acquisition Act
- Toll Act
- Environmental Laws
- National Highways Act
- Relevant Legislation and State Laws

3.7.3 Financing of BOT Projects

Infrastructure financing being highly capital intensive in nature, the project promoter is wholly responsible for raising the necessary finance

The financial resources can be raised by a combination of equity, debt and mezzanine capital. While the export credit agencies and institutional investors provide long term financing, the banks short term credit and the investors in their turn the risk capital. As regards the share of each form of the capital there is no specific formula to suggest any ideal Debt-Equity (D/E) ratio for the success of a BOT infrastructure project. However, the Ministry of Surface Transport, Government of India, has recently announced an acceptable lower limit of equity as 15 percent of the project cost.

3.7.4 Major Contractual Agreement

The contractual agreements are vital for successful management of BOT projects. All the parties involved in those agreements must exhibit their commitment and also a deep sense of involvement in each stage of implementation of the project.

The project company generally enters into several agreements- viz.,

a. **Project Agreement /Concession Agreement**

The project agreement is the primary contract between the project company and the host government. The project agreement forms the contractual base in the pillar of which other contracts are developed. This contract entitles the project company to build and operate the project facility; it also outlines the condition regarding the technical specifications to be adhered.

The toll rates and the time period of transfer all these aspects are embodied in the Project Agreement.

b. Construction Agreement

This agreement involves the turnkey construction contracts covering all the work. The construction agreement is normally based on fixed price principle, i.e. once the value of the tender of construction is decided, the same will not be changed. However, under abnormal and extraordinary circumstances, the contract can be negotiated upon between the project and the construction company.

c. Operation and Maintenance Agreement

The operation and maintenance part of the BOT road project during construction period can be subcontracted to an O & M operator who would be responsible for the maintenance of the road and its facility.

d. Operational agreement

The operations part including tolling and tolling collection, printing toll tickets, maintenance of an escrow account etc. Such activities can be subcontracted to an operator who would take care of toll collection. An agreement has to be entered between the company and the operator.

e. Credit Agreement

This agreement provides for the risk of non-repayment of loans and it is signed between the project company and the lenders. The loan security structure is included in the agreement.

3.7.5 Concept of Toll

Different countries have evolved various kind of mechanism to levy the toll on the roads. In India, toll rates for BOT projects are being fixed by the NHAI along with the guidelines for private investment in infrastructure.

There are also examples of existing non-tolled highway with significant traffic volumes in which tolls have been applied to leverage funds.

for maintenance and rehabilitation such rearrangements are generally referred to as maintenance concessions

Toll financing for maintenance purpose is generally adopted on the economic rationality that the roads carry reasonable volumes of traffic over 3,500 vehicles per day. Further the toll revenue shall not only cover the cost of operation and maintenance but will make a small contribution to capital costs (involving either new construction, or rehabilitation or improvement of an existing road). Even some countries have introduced tolls at selected points on the road network to simply generate revenues to cover a part of the O & M costs. Such revenues are generally deposited into the consolidated fund.

3.7.6 Principle of Toll Price Fixation

The toll prices are always based on different socio-economic rationality that the toll should cover a part of the costs involved in the construction of the facilities, but in fixation of such prices the abilities of the road users, their willingness to pay in terms of consumer surplus, time saved in travel and fuel saved are taken into account by the Authorities. The various principles involved can be divided into

a. Users pay basis

The rationality is that the users of the road, who are benefited in terms of time saving, fuel saving and above all, congestion must bear a part of the cost. Both the attributes to pay and extent of benefits derived should be considered in fixation of toll prices. It is also governed by the neo-classical context that, "there is nothing like free lunch".

b. Govt. subsidy on per user basis (shadow Tolls)

Shadow tolls are per vehicle subsidy amounts paid by the government to a facility operator by a third party such as, a sponsoring government entity but not by facility users. Shadow toll amounts are paid to a facility operator depending upon the type of vehicle and distance traveled.

Under this concept, the road user is not charged anything directly for the use of the facilities. Instead, the road agency pays a concessionaire to operate and maintain the road (the concession may also call for some initial capital works) for an extended period of time in return for an agreed payment related to volume of traffic. In some cases, the payment is based on lane availability, rather than volume of traffic.

Shadow toll should be structured in such a way that it facilitates the undertaking of a project that is not economically viable but the social benefits are high. Since such infrastructure projects are capital intensive in nature and long term financing is involved, shadow tolls if agreed upon definitely have a bearing on the project formulation so that project can be financed at lower cost.

Shadow toll can be an element of highway finance approach where the public or private sector developer/operator accepts certain obligation and risks – such as construction, operations and most specifically traffic flow. The developer receives periodic shadow toll payment in place of or in addition to real or explicit tolls paid by the users.

Payment by the government to the operator should be primarily based on actual traffic levels, as measured in vehicles kilometers. However, it was up to the bidding consortia to propose a precise formula for determining the payments. The major advantage in shadow tolling is that since payment would start when operation begins, the operator will hasten the process of construction.

Similarly, deductions from toll payments will be made for lane closures (not including those required by the police or utilities). The deduction will vary depending on the number of lane-miles closed, the length of time, and the amount of expected traffic inconvenienced. Thus, payments to the

companies could be on the basis of shadow tolls to cover life cycle costs-construction plus operations

Shadow toll payments could be met from recurring annual payments from a federal or state program, or other sources. Alternatively, a federal grant or single state appropriation could be used to establish a fund that could permit necessary construction to be subsidized and on going operating revenues to be supplemented via shadow tolls

c. Charges based on the time of travel (congestion pricing)

Congestion pricing charges are a premium on road users who wants to drive during peak periods such as rush hours or holiday weekends. Drivers pay the toll to enter congested areas. The toll varies according to the level of congestion with higher tolls during peak hours or in peak direction

During peaks periods, users would pay a fee in exchange for greater convenience, fewer delays, and prompt access to a free-flowing highway lane. Revenues from such fees can be used to help in supporting alternative forms of transportation or for improvement in other environmental measures

d. Discount system

Discount systems are used to increase toll revenues by encouraging continued or increased use of expressway which ensuring the certain fairness among users under a basically uniform rate system.

The separate discount system provides a large-scale discount to large-scale users

The disadvantage in the system is that the large-scale users are given discount thus creating an imbalance in the case of other users.

- “ In India the most widely used practice for tolls in the “User pay basis” where the users of the road have to pay certain amount for the usage of the facility. For National highways, the NHAI act enumerates the users basis toll system and has prescribed toll rates/km basis in its rules, which is provided in the table -

The fee under sub-rule (1) for projects involving conversion into four-lanes of existing two-lane of national highways shall not exceed the capping rates given below at June 1997 prices, namely

Table 3.2 Toll Fee for the Highways Converted from Two lane to Four lane

S No	Type of vehicle	Rate
1	Car or Jeep Or Van	Rs 0.40 per km
2	Light commercial vehicle	Rs 0.70 per km
3	Truck or Bus	Rs 1.40 per km
4	Heavy construction machinery and Earthmoving equipments	Rs. 3.00 per km

For state Highways and bye passes the state governments and its related departments are deciding authority. Innovative methods of tolling can be adopted if there is a trade-off between the economic benefits and project viability.

Disadvantages of toll system

Tolls are mostly inequitable and in addition, they are usually inefficient to raise revenues, because of the following reasons:

- If only some and not all roads are tolled, this is inequitable to the users of the tolled facility.

- To avoid the toll, low-income users may suppress trips, leaving only the higher income users as beneficiaries
- To avoid the toll, users may follow inefficient routes
- Cost of collecting tolls are exceedingly high
- Tolls are insufficient because, unless the roads is congested they are likely to provide a signal for wrong pricing Any toll on an un-congested road, say above the marginal cost per unit of traffic on the road, would restrict traffic when it should not be restricted The toll should be such that demand is restrained only to the point where the facility returns to its full uncongested use

3.7.6 Advantages of a BOT project.

- ❖ A BOT project has the potential to attract foreign capital to the country.
- ❖ Government saves on the infrastructure development cost, which can be used for the other purposes.
- ❖ Debt burden is shifted to private promoter.
- ❖ BOT projects possess in-built incentives for better economic performances.
- ❖ A private company is responsible for financing, construction and operation of the BOT project

In spite of these advantages, the BOT projects, no doubt, involves some risks in term of development risks, construction risks, operational risks, and legal risk, which are discussed in the following sub-section.

Additionally, if conducted in a fully transparent environment, BOT will promote open competition and provide the lowest cost. If the deal is properly structured by the government, most of the project risk will be responsibility of the private sector. The private sector can provide wider

.. access to capital market, better management skills and access to latest technology, and implement a project faster than the public sector. With this, the project financing is “off” the government balance sheet and can allow governments to allocate scarce resources to entire priority areas, such as rural development, poverty reduction, education and health.

3.7.7 Risk Involved in a BOT Project

The main risk involved in a BOT projects are-

Development Risk

Even though the developer might have invested some money in undertaking preliminary investigation, preparing the EIA and economic feasibility report, these involve a risk that the proposal could be rejected by the host government or the financiers. However, this can be avoided by making the bidding and evaluation process transparent.

Indian experiences in this regard show that when bidding process is transparent funding from multilateral agencies like ADB and IFC are easier to rope in on a project source basis.

Construction Risk

The contractor could be severely hampered by land acquisition disputes, environmental issues and rehabilitation and resettlement problems. These could lead to extension of construction period, which ultimately results in increase in indirect cost of the project.

In order to reduce such risks the contractors should be invited to participate in the equity of the project vehicle. Further the contract should have specific penalties for time-cost overruns on matters in the control of the contract.

Operational Risk

Operating risk are those which affect the concessionaire in operating the BOT project, risks which affect the project returns. They could be shortfalls in the traffic streams, competing alternate road nearby etc.

Two alternatives by which operating risks can be mitigated to a great extent are

- Government is often requested by the concessionaires not to improve the quality of the existing alternative roads during the period of concession
- Government could promise a certain level of traffic or could subsidize any part of the shortfall by a revenue subsidy

Legal Risk

Under the existing National Land Acquisition Act, only the government can acquire the land at nominal rates (at prices below market price for infrastructure development). It does not entail the transfer of the acquired land to any other entity other than government-owned undertakings. Land acquisition by a non-government entity or BOT company with partial government participation is likely to lead to protracted legal disputes when the acquisition is made under this act. For National highways it is clear that the land acquisition would be done by the Government. For state highways and roads it is not so quite clear as to whether land should be acquired by the promoter or by the state government. But it is better that land is acquired by the state government (Dhir et al, 1996).

The assumption of total certainty in the analysis of BOT projects which are prone to risks would be inappropriate and may prove costly to both the government and the prospective operators. Many factors such as construction cost, duration of construction, operating cost are risk prone due to the nature of the project itself. As a result, the expected financial performances also cannot be predicted with certainty.

Hence the overall analysis regarding the BOT project indicates that the scheme should be sound when subjected to economic analysis and the project is bankable with adequate potential returns guarantee to the investor

3.7.8 The Possible Weaknesses Involved in BOT Project

BOT projects for infrastructure in India are literally in their infancy. Time will tell how clear, creative and prudent we have been. In spite of the initial enthusiasms for BOT, now a more cautious attitude is being shown as many BOT proposals have failed to meet their expectation.

The possible weaknesses in BOT could be -

- The total cost of the project may be high. This has to be weighed against the private sector cost of capital, project sponsors and private parties accepting all the risk, and guaranteeing a fixed completion date.
- The BOT mechanism can give monopolistic control to one operator. This needs to be monitored.
- Lack of planning, technical skills and negotiating skills by the government agencies to develop a proper program and thereby to negotiate fair deals on behalf of users.

Many BOT proposals have failed to meet desired expectations. The reasons for failure are summed up below:

- Protracted negotiations regarding the risk allocation and guarantees.
- Aggressive marketing, lack of competition and transparency in the process of awards.
- Inadequate preparation on the part of the government.
- Confusion of the market by competing schemes and government agencies.
- Unexpected additional cost to the government, and accusation of corruption.

3.8 Road project in India Under BOT Scheme

Table 3.3 List Of Build-Operate-Transfer (BOT) Projects Awarded As On 8th September, 1999

Sl. No.	Name of the Project	NH No.	State	Length in Km	Cost in Rs.Crore	Likely/ Actual date of completion	Agency	Current Status
1	Thane-Bhiwandi Bypass*	3 & 4	Maharashtra	24	103	31.12.2001	MOST	In Progress
2	Chalthan Road Over Bridge**	8	Gujarat	4-LANE	10	15.07.1998	MOST	Completed
3	Udaipur Bypass**	8	Rajasthan	11	24	22.04.1998	MOST	Completed
4	Construction of six bridges	5	Andhra Pradesh	6 nos Bridges	50	08.06.2001	MOST	In Progress
5	Coimbatore Bypass	47	Tamil Nadu	33	90	03.12.1999	MOST	In Progress
6	Drug Bypass	6	Madhya Pradesh	18.4	68	5.05.2000	NHAI	In Progress
7	Narmada Bridge	8	Gujarat	6	113	21.12.2000	MOST	In Progress
8	Narmada ROB**	3	Maharashtra	13	34.21	22.07.1999	MOST	Completed
9	Patalganga Bridge & ROB**	17	Maharashtra	1 No	33.3	20.07.1999	MOST	Completed
10	Hubli-Dharwar Bypass	4	Karnataka	30.35	68	05.11.2001	MOST	In Progress
11	Nellor Bypass	5	Andhra Pradesh	18	73	Oct., 2000	NHAI	Concession Agreement signed
12	Koratalaiyar Bridge	5	Tamil Nadu		30	Nov., 2000	MOST	In Progress
13	Khambatki Ghat tunnel & Road	4	Maharashtra	8	37.8	Nov., 1999	MOST	Completed
14	Nasirabad ROB	6	Maharashtra	30 m	10.45	May., 2001	MOST	In Progress
15	Wainganga Bridge	6	Maharashtra	530 m	32.6	July., 2000	MOST	In Progress
16	Mahi Bridge	8	Gujarat		42	25.04.2000	MOST	In Progress
17	Kishangarh Bypass ROB	8	Rajasthan		16.66	31.12.2009	NHAI	In Progress
18	Bridge across river Watrak	8	Gujarat		48.2	-	MOST	In Progress
19	Moradabad Bypass	24	Uttar Pradesh	18	100	-	NHAI	In Progress
20	Derabassi ROB	22	Punjab		36.11		MOST	Concession Agreement signed
TOTAL					1020.33			

*Original Work Since completed and opened to traffic. Widening to four lanes is in progress.

**Since completed and opened to traffic.

Chapter 4: ENVIRONMENTAL IMPACT ASSESSMENT OF DEVELOPMENT PROJECTS

4.1 The Concept of EIA

EIA is the process in which environmental factors are integrated into project planning and decision making so as to achieve ecologically sustainable development.

EIA has been defined by Jen, Urban, Stacey (1977) in a simple yet convincing way as “A study of probable changes in the various socio-economic and bio-physical characteristics and the environment, which may result from a proposed or impending actions”

Munn(1979) defines EIA in a more precise terms as an activity designed to identify and predict the impacts on bio-geographical environment and on man's health and well-being of legislature proposals, policies, programmes, projects and operational procedures, and to interpret and communicate the information about the impacts

Heer Hagerty (1977) defines EIA as an “activity that aims at establishing quantitative values for selected parameters which indicates the quality of environment before, during and after the proposed activity

A growing number of development planners and managers now recognized that EIA is an excellent preventive planning to, provided that it is implemented early in the project development sequence.

Thus, EIA can be used for fulfillment of three principle functions: -

- As a decision-making instrument, to decide whether envisaged project is acceptable from the viewpoint of its cost
- As decision making instrument to choose between different ways of doing a project or locations in which it can be done
- As a planning tool, to minimize adverse impact that may be cost by the project

However the best practice in EIA involves identifying environmental risks, lessens conflicts by promoting community participation, minimizes adverse environmental effects, inform decisions makers, and help lay the base for environmentally sound projects. Benefits of integrating EIA have been observed in all stages of a projects from exploration and planning, through construction, operation, decommissioning and beyond its closure

4.2 Dimensions of the Environment

The component of the environment are inextricably linked – no component exists in total isolation, and nothing can be changed without affecting something else consequently positive environment cannot be assessed simply by examining its components in isolation: instead, they must be considered as parts of the whole.

The various dimensions of the environment can be catagorised as - (Rau, and Wooten, 1985)

- i) Physical environment
 - ii) Social environment
 - iii) Aesthetic environment
 - iv) Economic environment
- (i) Physical environment

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- a) Land and climate – general engineering properties of soil, geology, topography, subsurface conditions, special conditions like flood plains, land slide, earth quack, right of way etc and climatic conditions of the area is included in this category
- b) Vegetation, wildlife, and natural areas – This includes biological factors mainly extent and type of vegetation and wildlife, and existence of unique natural systems such as stream systems, wildlife breeding areas, forest and wildlife areas on the site and in surrounding areas
- c) Surrounding land uses and physical characteristics of the area – This includes various types of development like single family or high rise residential buildings, industrial and commercial buildings, open space, population density, housing density, industrial and commercial footage per acre of land, building design etc All these are man-made components contributed to physical environment
- d) Infrastructure/public services- This includes water supply sources, their quality and distribution, sanitary sewage and solid waste facility, storm water drainage, energy resources, transportation systems and communication facilities
- e) Air Pollution Levels- This includes information about major sources of air pollution, extent of pollution and frequency of inversion etc in the area.
- f) Noise Pollution Levels- The various sources, ambient noise level and vibrations are included in that.
- g) Water Pollution Levels-Variou sources of water such as, ground water and /or surface water relevant to the site or area, quality of source of water supply, sewage disposal system, sources of water pollution and water treatment facilities etc.

(ii) Social Environment

- a) Community facility and services – This includes location and capacity of schools, recreational and cultural facilities in the area, police, fire fighting, health and social services facilities servicing in the area, local public transportation etc
- b) Employment Centers and commercial facilities servicing area
- c) Character of community, which includes socio-economic and racial characteristics, community life facilities and activity, population size and distribution and prevailing housing condition in the area

(iii) Economic environment –

This factor includes the economic factors like employment and unemployment levels, levels and source of income, economic base of the area and its surroundings availability of critical factors of production, demand patterns, land values, taxes, economic administration, trade, land ownership including private, local, public, state etc.. These factors would be having close links with social and cultural factors and therefore constitute together what we call as socio-economic environmental inventory of the area or region under study

(iv) Aesthetic environment-

This category includes the sub factors like architectural character of the existing buildings, existence of onsite, or proximity, to significant historic, archeological, or architectural sites or objects, scenic areas, views and landscapes. People derive pleasure by seeing such objects

4.3 Process of EIA

The process of EIA can be broadly divided into five phases, namely Impact Identification, Impact Prediction, Impact Evaluation, Summarization and Communication of Impacts, and Monitoring of Residual Impacts. The first four phases are the pre project activities while the fifth phase is a post project study. The fifth phase is generally carried out in countries where EIA procedures are well established (e.g. as in USA, Canada, U.K., and Australia).

Impact Identification

This involves identification of significant impact in individual cases. The impacts are project specific and site specific and can not be generalized for a particular project or location. It requires the following

- a. Identification of the features of the proposed project (site location, project size, project design features and pollution control measures, and project timing relative to construction and operational issues), the need for the project, and the activities.
- b. Definition of the scope of the impact study, which in turn needs information related to environmental laws, regulation and or policies, related to physical-chemical, biological, cultural, and socioeconomic environments. The scope also depends upon resources (man, money and data and computational facilities) available for EIA study.
- c. Quantitative identification of impacts due to anticipated projects.

The Oregon Highway department (1973) has developed an interaction matrix for impact identification, and the various actions and environmental factors included in this matrix shown in the table 4.1

Impact Prediction

Impact Prediction basically refers to the quantification, where possible (or, at least, the qualitative description) of the anticipated impacts of the proposed project on various environmental factors. It involves (i) base line study of the present environmental status of the area and (ii) calculation of the action on the various environmental factors with the help of mathematical models.

Impact Evaluation/ Assessment

Impact assessment represents a blend of technical information and analysis along with value judgment. It includes following aspects:

- Conversion of impacts into environmental quality parameters. The methodologies for conversion are Battelle Environmental Evaluation System (BEES), Cost benefit Analysis (CBA), Multi-Criteria Decision Making Technique (MCDMT) etc.
- Input from the public. This input could be received through a continued scoping process or through the conduction of public participation process.
- Identification and evaluation of impacts mitigation measures.
- Selection of the proposed action from alternatives, which have been evaluated earlier.

Table 4.1 Highway Interaction matrix Developed by Oregon highway department (Canter, 1996)
 The Oregon highway department (1973) has developed an interaction matrix for impact identification actions and environmental factors included in the matrix form shown in table below:

HIGHWAY INTERACTION MATRIX			
Actions that may cause impacts		Environmental conditions	
Category	Actions	category	factors
A Element of design and location	1. Modification of Regime	A. Physical and Chemical characteristics	a. mineral resource, precious
		1. Earth	b. Mineral resources, common
2. Land transformation and construction	a. Modification of habitat		c. Soils
	b. Alteration of groundwater hydrology	2. Water	d. land form
	c. Canalization		a. surface
	d. Irrigation		b. Ocean and estuaries
	e. Surface and paving		c. Underground
	a. Highway and bridge construction		d. Snow and ice
	b. Road and trail construction		e. Recharge and percolation
	c. Construction and barriers including fencing		f. Quality
	d. Channel dredging and straightening		g. Temperature
	e. Channel revertment	3. Atmosphere	a. Quality
	f. Dams and impoundments		b. Climate
	g. Piers and seawalls		c. Temperature
	h. Recreational structure		a. Floods
	i. Cut and fill		B. Erosion
	j. Tunnels and underground-structure construction		c. Deposition (air and water)
	k. Erosion control		d. Solution
	l. Landscaping		e. Compaction and Settling
	m. Harbour dredging		f. Stability (sides and slumps)
	n. Marsh fill and drianing		g. Air movements
	o. Scenic-wayside alteration		h. fire
	p. Junkyard and billboard removal		i. Evaporation

3. Well drilling 4. Resource renewals and protection 5. Changes in traffic	a. Reforestation b. Scenic-strip acquisition a. Railways b. Automobile c. Trucking d. River and channel traffic e. Pleasure boating f. Trails g. Communication h. Pipelines	B. Biological Characteristics 1. Flora	a. Tree b. shrubs c. Grass d. Crops e. Microflora f. Aquatic plants g. Endangered species h. barriers i. Corridors
B During construction 1. Modification of regime	a. Exotic flora and fauna introduction b. Biological controls c. Alteration of groundwater cover d. alteration of drainage e. river control and flow modification f. Burning	2. Fauna	a. Birds b. Land animals c. Fish and shellfish d. Other aquatic organism e. Insects f. Microfauna g. Endangered species h. barriers i. Corridors
2. Land transformation and construction	a. Blasting and drilling b. Marsh fill and drainage c. Clearing and grabbing d. Dam impoundments	C. Cultural factors 1. Land Use	a. Wilderness b. Open spaces c. Wetlands d. Forestry e. Grazing
3. Resource extraction	a. Blasting and drilling b. Surface excavation c. Subsurface excavation d. Well drilling and fluid removal e. Dredging		f. Agriculture g. Residential h. Commercial i. Industrial j. lakes and rivers
4. Change in traffic	a. Railway b. Automobile c. Trucking d. River and channel traffic e. Pleasure boating f. Trails	2. Recreational	a. Hunting b. Fishing c. Boating d. Swimming

Summarization and Communication

This phase activities are associated with preparing the written document to proposed project. It includes preparation of complete environmental impact statement (EIS). The summary should ensure effective communication to both technical and non-technical people.

Monitoring of Residual Impact

It involves implementation of appropriate environmental monitoring programs. Monitoring is not limited to physical environment. It also includes other constituent's vis-a-vis, ecological, socio-economic and aesthetic environment.

The review of the literature reveals that the process of EIA is well developed. There are several methodologies and examples available for each step of the EIA process. Specially, the method for impact identification are well defined and implemented. The problem arises with the impact prediction and evaluation. The impact prediction basically involves modeling of the environment, which in term means, number of assumptions to simulate real environment to mathematical equations. Many environmental impacts are non-quantifiable, or the huge monetary and personal requirements to accomplish such quantification impose serious constraints in keeping such aspects within the scope of the EIA study. The subjectivity or personal bias involved in the decision making also a major constraint of EIA process. Most of the methods and examples are developed in the countries where the EIA process is well implemented, particularly for their problems. Most of the countries lag in expertise to conduct EIA and require modification of the process according their need, economic status, technical knowledge, databanks and priorities of development. From above discussion it can be

stated that, theoretically EIA process is well established. However, due to practical constraints like lack of resources both monetary and others, personal bias and political interference in decision making, inherent limitations of impact prediction and evaluation and also the attitude of proponent to anyhow meet the legislative requirements sets many loopholes.

4.4 Methodologies of EIA

As described in the previous section, the EIA process includes three major activities: namely identification, prediction, and evaluation of impacts. The objectives of these activities differ. As such the pertinent methodology for accomplishing the task set for each activity is also different. Following sections briefly review the methodologies adopted for various activities in EIA process.

Methods for Identification of Impacts

The proper identification of impacts is desirable, because the elimination of a factor at identification stage saves the cost of subsequent impact prediction and evaluation of the factor. To aid this the goal and scope of EIA should be defined clearly before identification, and the identified impacts should be revised depending on the baseline status of the earlier identified impact parameters. The various methodologies examined can be divided into six types based upon the way impacts are identified.

- Ad-hoc
- Overlays
- Checklist
- Matrices
- Networks

Methods for Prediction of Impacts

Methods for prediction cover a wide spectrum. Number of conceptual models are available for the prediction of each constituents of environment viz air, water, land, ecology, socio-economic, culture, and noise. Most of these models are intuitive and are based on several unrealistic assumptions, which idealize the complexity of nature of environmental processes. For example, for the prediction of air quality depending on the data available one can use Gaussian model, Proportion model or Box model. Methods for predicting qualitative effects are difficult to find or to validate. In many cases, the prediction consists of indicating merely whether there will be degradation, no change, or enhancement of environmental quality. In other cases, the qualitative ranking scales (e.g. from 10 to 100) are used.

Methods for Impact Evaluation and Decision Making

In EIA studies, decision makers, whether motivated by the need to predict or to control, usually face complex systems of interrelated components, such as resources, desired outcomes or objectives, persons or group of persons, etc. and are interested in analyzing the such systems. Presumably, proper understanding of this complexity will lead to the better prediction or decision. Determining what is “good” decision is a value judgement.

There can be two views as to what can be a good decision. On the one hand there is a view that the decision is good if the outcome is good. In this case whether decision is good cannot be determined until after the event. The other prospective is that decision is good if the process followed is

“good” In the context of environmental decision -making, it may be long time before the outcomes are known, and therefore the process aspect may be weighted more heavily. The major characteristics of environmental decision-making are the existence of the considerable uncertainty, the potential for decision that leads to irreversible outcome and the likelihood of the multiple decision makers and the multiple objectives.

Environmental impact studies typically address the minimum of two alternatives (with project and without project) and can include upwards of many alternatives. The categories of alternatives for project generally may include (i) Site selection alternative (ii) decision alternative for the site (iii) construction, operation and decommissioning alternatives for decision (iv) project size alternative (v) phasing alternative for size grouping (vi) no project or no action alternative (vii) timing alternatives relative to project construction, operation and decommissioning. Variety of systematic methods for comparing and evaluating the alternatives have been developed for EIA's. These methodologies represent adaptation of multiple criterion or multiple attribute decision-making techniques and in other fields, such techniques are also called “ decision analysis technique” or “ decision support system” The following methods have been used for impact evaluation in EIA studies

- Matrices
- Overlays
- Checklist
- Cost- Benefit Analysis
- Utility Theory
- Stimulation Modeling Techniques
- System Diagrams/ Network Approach
- Other Multiple Criteria Decision Making Technique

Ad-hoc method

This is the oldest and crudest and perhaps the crudest approach to EIA. Ad-hoc method provides qualitative assessment of the total impact with suggesting the broad areas of possible impacts and the general nature of these possible impacts, for example, impacts on plant and animal life might be stated as minimal but adverse, whereas the impact on regional economy might be stated as significant and extremely beneficial. These statements are qualitative and could be based on subjective or intuitive assessment, or could be qualitative interpretation of the quantitative results. This method does not address the secondary impacts. In this method a team of specialists depending on their area of expertise would provide minimum guidance without going into detailed scientific investigation of environmental impacts of the projects and improvisation of the impacts. The impacts and their types such as short term or long term, reversible or irreversible etc. are examined merely on guess basis. Opinion poll, experts opinion, Delphi methods etc. all come in the category of ad-hoc methods of EIA.

This method as the name suggests, is ad-hoc with little quantification or precision. Nevertheless the method is useful when discussing impacts of very large systems such as Himalayan ecology on flooding plains down streams, acid rain on global environment, degradation of Indian lands or aquatic weeds on water resources. It can also become Pre-EIA exercise in some conditions. This method merely suggests the broad areas of the general natures of the possible impacts. This method is rather subjective or intuitive and is less in use for specific needs.

Checklists

It is the updated version of the ad-hoc approach. However they are quite elaborative and involved systematic assessment of the environmental impacts.

of project and other activities. The use of impact checklist provides a method combining a list of potential impact area that need to be considered in the EIA process with an assessment –often qualitative of the individual impacts. The listing of environmental impact parameters is normally done category wise i.e. in structured form. Checklist may be provided to facilitate rapid assessment of environmental impacts, quantitatively. Environmental protection authority may provide such checklists for specific types of projects to ensure all important items are given due consideration. For example, there may be a specific checklist for water resources development projects, highway projects, petrochemical industries, power plant projects and so on.

There are four categories of checklists in use -

Simple checklist: - represents list of environmental factors which should be addressed; however, no information is provided on specific data heads, methods of measurements, or impact prediction and assessment.

Table 4.2 Environmental areas vs. types of impacts

Environmental Area	No effect	Positive Effect	Negative Impacts	Direct	Indirect	Short Term	Long term
Wild life			X			X	
Air Pollution			X	X			
Water pollution		X				X	
Noise			X			X	
Eco Value		X		X			X
Public Health				X			

Descriptive checklist :-It is an extension of the simple checklist. Descriptive checklist refers to methodologies that include list of environmental factors

along with information on measurement and impacts prediction and assessment

Scaling Checklist This is similar to the descriptive checklist, but with additional information on the subjective scaling of these parameter

Scaling-Weighing Checklist - this is essentially similar to the scaling checklist but additional information is provided as to the subjective evaluation of each parameter with respect to all other parameter. Scaling and weighing checklist are the most complicated. The environmental evaluation system developed by Battelle (discussed below) is a type of scaling-weight checklists

Battelle Environmental Evaluation system (BEES)

The BEES is weighting-scaling checklist methodology proposed for water resources projects. This method has been identified as one of the most quantitative methods. In the BEES, 78 measurable environmental parameters are divided into four major categories of ecology, environmental pollution, aesthetic, and human interest. The first step includes the conversion of parametric estimates into environmental quality (EQ) scale that range between 0 and 1, where 0 denotes the extremely bad quality and 1 denotes very good quality. It is done using value function curves. The next step includes multiplication of EQ values with the representative parameters importance unit (PIU) value to obtain environmental impact unit (EIU) for each parameter. Addition of EIU values provides a composite score. Total environmental impact is calculated by evaluating the expected future condition of the environmental quality with and without the project.

$$EIU_j = \sum_{I=1}^n EQ_{ij} PIU_j$$

Where EIU_j = EI unit for, i^{th} alternative

EQ_{ij} = Environmental quality scale value for i^{th} factor and j^{th} alternative

PIU_j = Parameter importance Units for j^{th} factor

Advantages of the checklist method

- Checklists provide all possible relationships and impacts, out of which a set tailored for the specific assignment may be chosen
- Checklist help people in responsible position to become more aware of what they should be looking for when assessing a proposed project
- Checklist may also help to produce a higher degree of awareness of the environmental aspects of a project
- Quantification of impact is possible using the weighted-scale method.

Limitation of the checklist method

- Descriptive checklist may be exhaustive, including the impacts during the various stages of the project. However, no quantitative information is provided regarding magnitude and degree of impact
- Another important drawback of this method is away it attempt to compartmentalize the environment. Environmental system comprise a complex web of interrelated parts, often incorporating feedback loops. This fact is not included in the weighted checklist. This method should be therefore used with some caution. Its quantitative features may be used to

distinguish between alternatives and should be used only when a comparison needs a quantitative resolution

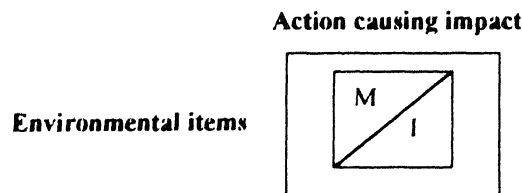
- The main drawback in the checklist method is the inability to relate individual activities to environmental components affected by these activities

Matrix Method

This method and its variants provide us a framework of interaction of different actions or activities of a project with potential environmental impacts caused by them. A “simple interaction matrix” is formed where projects actions are listed along the one axis and the other axis, say horizontally. Such a matrix allows us to identify the cause-effect relationships between various actions and the environmental impacts associated with them.

Pioneering work on the matrix is done by Leopard, et al (1971) which was refined further by Canter (1986) ESCAP (1990), Lohani and Halim (1990) and several others. It is also been extended further in the form of “stepped matrix” to take care of “cross impacts” i.e. impacts in subsequent rounds induced by the first round impact.

The process of the use of the matrix for assessing environmental impacts is very simple. It starts with the identification of all the proposed actions that are parts of the proposed projects. The impacts of these actions are then identified or anticipated and the matrix is marked



Stepped Matrix it is an extension of the simple matrix to address secondary and tertiary impacts of initiating actions. These are also called as “crossed impact matrix” the figure below displays the concept of the stepped matrix.

Matrices are widely used for impact identification and sometimes also for impact evaluation.

Advantages of the Matrix Method

- Matrix structures allow for speculation of impacts characteristics albeit in a subjective way. This provides a gradation in the impacts, thereby providing a focus for further studies, verification, or discussion. It also estimated to alleviate the impact speculated.
- It presents an easily understood summary of large number of primary impacts.
- It is generalized but well-defined approach, forcing a comprehensive consideration of environmental components and primary impacts.
- It is easily performed process, which can specify the overall character of a project early in the design phase.
- In an extended form, the method can include the assumptions supporting the assessments.
- Matrices have low resource requirement.

Limitation of the Matrix Approach

- Despite of the elegance of the matrix presentation, there are certain limitations, which need to be addressed.
- Unless weight scaled impact score are used, the comparison of too many project alternatives is difficult.

- Scaling the multitude of score contained in a matrix is also not a tractable proposition, as the ability to independently replicate the method is undetermined by a dependence on highly subjective judgments
- The impact characterization step of the matrix involves subjective prediction as well as assessment
- There is a little opportunity for quantification. However it is possible to accommodate further detailing in the matrix presentation if prediction evaluation techniques are separately used
- While developing matrix structure, it becomes apparent that higher order impacts are not accounted for using this approach

For example, impacts propagate from one component to another and not necessarily linked directly with the project activities. In the case of a thermal power plant waste emission alter the air quality and the altered air quality in turn affects crops, public health, or materials

Overlays Method

Overlays techniques is sometimes also referred as McHarg's method. This methodology relies on a set of maps of the project's areas environmental characteristics covering physical, social, ecological, aesthetic aspects. These maps (or transparencies) are overlaid to produce a composite characterization of the regional environment characteristics. Impacts are identified by noting the impacted environmental characteristics lying within the project boundaries.

Computer programs can be used to overlay the maps and thus arrive at the conclusion regarding the environmental impacts of the project in the concerned location.

This is highly aggressive approach and is best suited to short list the alternatives, where decision is mainly based on physical characteristics (Abbasi et al, 2000)

This approach seems to be most useful as a method for screening alternatives sites or routes, preliminary to detailed impact analysis. Limitation of the approach include its inability to quantify as well as identify possible impacts and its failure in implicit weighting of all characteristics mapped. Use of this technique is possible only if suitable maps or data base adequate to draw the maps exists in a country.

However, the recent technique of the remote sensing through electromagnetic rays is increasingly being used for this purpose through it is costly.

This would be primary difficult in adopting this methodology in developing countries.

Network Approach of Analysis

The network method of EIA basically uses the matrix approach by expanding it further to take into account the primary as well as secondary impacts in the cause-effect, cumulative effects network framework.

In this method the idea is that, each environmental sub systems are interrelated and any impact on one of this subsystems affects several other subsystems. Thus a primary impact leads to secondary, tertiary, and higher order impact.

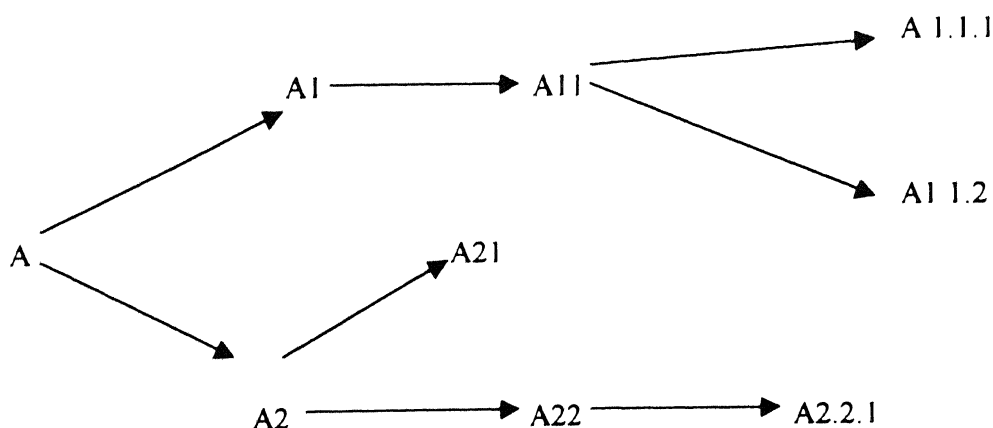


Figure 4.1 The Network Approach for EIA

Network approach recognize this interactive nature of environmental components and take an ecological approach for identifying the secondary and tertiary impacts

This approach has been identified as one of the best approach for assessing higher order impacts, although quantification of impact is still subjective in nature

One advantage of this type of approach is that it allows user to identify impacts by selecting and tracing out the events as they might be expected to occur

A major problem in constructing cause-condition-effect network is achieving the degree of detail necessary for informed decision- making. On the other hand if the environmental condition changes are described in detail and all possible inter-relationships are included, the resulting impact networks could be too extensive and complex to be really useful

Delphi Technique :-

Delphi is a method based on the intuition/experts opinion, especially design to avoid the drawback associated with the other methods of opinion gathering

Delphi has three special characteristics: (i) anonymity between the participants, (ii) scope for statistical treatment of responses, and (iii) iterative feedback. A structured, formal and detailed questionnaire is given, by mail or in person. The different participants do not meet. The responses of the participants are analysed. Combined, averaged, and represented in quartiles and medians. Questions for the second round are then made, with modification if necessary. The averaged responses for the first questionnaire are provided to the participants. Apart from the original questionnaire, the participants may be asked to respond to scaled objective items and sometimes may be open-ended responses. After scrutinizing the answers to the second round, respondents in the upper and lower quartiles may be asked to justify their responses. Further iterations are continued

if necessary, to the point where diminishing returns set in. A convergence of opinion emerges but the originator of the Delphi avoids the convergence or conditioning responses.

Delphi can be used to forecast technological and social events and policy shapes.

The advantages of this method are

- It can be used when the problem may not be amenable to analytic techniques, but the solution could be found from a subjective group judgment,
- It can be applied when issues are controversial and there are serious disagreements amongst experts,
- It can be applied when issues are of such a nature when the individuals are unwilling to take a public stance, and
- It enables the participation of greater number of individuals than can effectively interact into face-to-face meetings, or time and cost constraints make frequent meeting infeasible.

Although widely used Delphi has been criticized in number of grounds

(Abbasi et al, 2000)

- There is pressure towards convergence and this may suppress other valid perspectives.
- The role of the Delphi coordinator is crucial and subjective biases may be introduced through this route;
- Lack of item clarity or common interpretation of scales and feedbacks may lead to invalid results and,
- It is time consuming as if questionnaire are long, one may tend to fill them in a casual manner.

Delphi can be used in early stages of EIA to identify impacts and importance rating of a new project for which readymade information are not available.

The information obtained by the Delphi method can, of course, be used as inputs to other methods

Cost-Benefit Analysis (CBA)

CBA method involves evaluation of the already identified impact factors in economic terms and to express conclusions in an economic, cost-benefit format. This requires identification of all gainers and losers, whether their gains are real or monetary. All beneficial consequences or benefits of an action (B) and all costs or detrimental consequences (C) are expressed in monetary terms, usually in net present value. Alternatively, actions are ranked according to the ratio (B/C) of benefits and costs.

The CBA integrates development with conservation and preservation consideration, rather than dichotomizing them. Moreover, the CBA approach presents the analysis in a form more readily understood by decision-makers and the public. The advantage of CBA approach is that it normally involves less time and financial costs in preparing EIAs (Hundole, et al., 1990). However, there are certain limitations associated with this approach like, the difficulty in measuring externalities (e.g. it is very difficult to depict the thermal stratification of lake in monetary terms). Another objection is that sometimes it is not possible to use money as a measuring rod for things such as natural beauty or health, and the attachment of humane values to natural ecosystems and aesthetics. Lund (1992) argued that CBA had failed to serve as a satisfactory evaluation measure of project impacts. The benefit-cost ratio for the project varies greatly depending on how the benefits and costs are classified. Moreover, it tells only the economic feasibility of project (if $B/C > 1$ project is feasible) and the desirability of the project. Theoretically CBA methodology has a wide scope and many advantages. However, the practical difficulties in measuring externalities limit its theoretically wide scope. Much more needs to be done in refining the gap between theory and practice of CBA.

4.5 EIA practice in India

4.5.1 Background

The CONSERVATION, protection and preservation of the environment is enshrined within the Indian Constitution, which enjoins the “ State to take measures to protect and to improve the environment and to safeguard the forest and wildlife of the country” However the constitution was one of the first in the world to recognize the importance of environmental conservation, this awareness has not prevented India from encountering major environmental problems as it strives to achieve its development aims (Banham et al, 1996)

India supports 16% of the world's population on only 2.4 % of the world's surface area, of which approximately one third is unsuitable for agriculture. In addition the whole of India is susceptible to natural disaster and extreme climate (ODA, 1994; World Bank, 1993). The majority of environmental problems facing the country today are related to the effect on the environment of its large and growing population and the direct and indirect effects of the policies which aimed to achieve economic growth and alleviate poverty through a Programme of rapid industrialization (ODA, 1994; Valappil, 1994).

As with most countries, India now seeks a form of sustainable development which will allow it to develop whilst maintaining an acceptable quality of environment and to stock of natural resources on which its future growth will depend.

Clearly, India now sees EIA as integral to its environmental policies and its attempts to achieve sustainable development

4.5.2 Development of EIA in India

Environmental Protection and Sustainable Development have been the cornerstones of the policies and procedures governing the industrial and other developmental activities in India. The use of environmental impact assessment (EIA) to ensure that the environmental considerations are built into the process of development project appraisal and clearance, has been increasing in India over the past 20 years.

4.5.3 Basic Laws of Environmental Protection

There has been significant environmental legislation in India beginning in the last century (for instance, The Indian Fisheries Act, 1897) and, as mentioned above, the Indian Constitution (1976) was one of the first in the world to incorporate environmental concerns. Nevertheless the key legislations that affect development projects is relatively recent. In chronological order it consists of:

- Wild life (protection) Act 1972
- Water (Prevention and Control of Pollution) Act 1974
- Water (Prevention and Control of Pollution) Cess Act 1977
- Forest (Conservation) Act 1980
- Air (Prevention and Control of Pollution) Act 1981
- Environmental (Protection) Act 1986
- Public Liability Insurance Act 1991
- The National Environmental Tribunal Act, 1995

Individual states while compelled to adopt the above legislation as a minimum, may introduce their own additional more stringent, legislation

Along side this legislation there are Land Use Planning and Zoning regulations in force at a state level (GOI, 1986, 1994a)

Table 4.2 Key Environment Legislation in India

Name	Scope and Objective	Key Areas	Operational Agencies/Key Players
Water (Prevention and Control of pollution Act 1974)	To provide for the prevention Controls sewage and enhancing the quality of water	control of water pollution industrial effluent discharges	Central and State pollution Control Boards
Air (Prevention and Control of pollution) Act 1981	To provide for the prevention, controls emissions of air and control of air pollution pollutants	Control emissions of air pollutants.	Central and State pollution Control boards
Forest Act 1927	To consolidate acquisition of common property such as forest	Regulates access to natural resources; state has a forests monopoly right over land. categories forests	State government forest settlement officers
Forest Conservation Act, 1980	To halt India's rapid deforestation and environmental degradation	Restriction on dereservation and using forest for non forest purpose	Central Government
Wildlife Protection Act, 1972	To protect wildlife	Creates protected areas (national parks/sanctuaries)	Wildlife advisory boards central zoo authorities

		categories of wildlife, which are protected	
Environment Protection Act 1986	To provide for the protection and improvement of Environment	An umbrella legislation Supplements pollution laws	Central Government nodal agency MoEF can delegate powers to state department of Environment

Source Government of India Publications)

4.5.4 Legal and Institutional Framework

Legal Framework:

The key framework legislation as far as EIA is concerned is Environment (Protection) Act, 1986 (GOI, 1986). The Ministry of Environment Forest in the above mentioned act promulgated a notification on 27th Jan, 1984 making environmental clearance mandatory for expansion or modernization of any activity or for setting up new projects listed in Schedule-I of the notification. Till 1994, EIA clearance from the Central Government was an administrative requirement for big projects undertaken by the Government or public sectors undertakings. EIA clearance from the central government is required for 29 categories of industries which can be broadly categorized under the following industrial sectors. mining, thermal power plants, river valley, ports, harbors and airports, communication, atomic

energy, transport (Rail, road, highways), and tourism (including hotels and beach resorts). For many other projects the EIA is not needed the notification states that the requirement of EIA can be dispensed with by the impact assessment agency (IAA) which presently under MOEF. The MOEF has developed guidelines for the preparation of EIA reports along with questionnaires and checklists for the following sectors namely, industry and mining projects, thermal power projects, river valley projects, rail, road, highway projects, port and harbors, airports, communication projects, new towns and parameters for determining ecological fragility. The decision on whether a project required clearances or not was taken by the MOEF using different criteria such as the size and the capital cost of the project. In some cases a high capital cost alone was sufficient.

The MOEF amended the EIA notification on 10th April, 1997 making public hearing mandatory for environmental clearance. Proposals, where forest land is a part of project site, need prior forestry clearance before forwarding to the MOEF for environmental clearance. In the environmental clearance process, the documents to be submitted to the MOEF are detailed project report (DPR), public hearing report, site clearances for site specific projects, a no objection certificate from state pollution control board, an environmental appraisal questionnaire, the EIA and the EMP report, risk analysis for projects involving hazardous substances, and rehabilitation plans if more than 1000 people are likely to be displaced.

Institutional Structures

The Ministry of Environment and Forest (MOEF) is the nodal agency in the administrative structure of the central government for planning, protection and coordination of the environmental and forestry programmes. The responsibility for translating the concerns for the environment into concrete action lies primarily with the Ministry of Environment and Forests.

(MOEF). This is relatively new ministry which was constituted in 1985 having grown out of the Department of the environment which had been setup in 1980. The MOEF is based in Delhi and there are six Regional Offices in Shillong (North-East), Lucknow (Central), Chandigarh (Northen), Bhopal (Western), Bangalore (Southern) and Bhubaneshwer (Eastern).

The CPCB and SPCB are the government agencies responsible for implementing the environmental laws at national level and state level respectively. The responsibility for pollution control lies with the state pollution control board (SPCB's) which were established in own state after the 1986 environmental protection act to enforce and implement the MOEF policies. The SPCB's are coordinated by central pollution control board (CPCB), based in Delhi, which sets the Minimum National Standards (MINAS) for environmental legislation. The CPCB is under the administrative control of the MOEF. The work of SPCB is to implement the environmental protection laws. The EIA reports are submitted to SPCBs, the EIA may require the clearance from MOEF depending on the project cost. The MOEF has appointed an Impact Appraisal Agency (IAA) which goes into the detail of the project. The IAA consists of maximum of the 15 experts in various disciplines (eco- systems management, air/water pollution control, water resources management, flora/fauna conservation and management, land use planning, social sciences/rehabilitation, project appraisal, ecology, environmental health, subject area specialist) and representatives from the NGOs/persons concerned with the environmental issue. The chairman of IAA should be an outstanding and experienced ecologist or environmentalist or technical professional with wide range managerial experience. Before the final clearance from IAA, the EIA is required to be made public for their remarks and suggestions (Sinha, 1996).

4.5.5 Problem with EIA & Issues in the Implementation of EIA

For India as in many developed countries, there is a lack of published information relating to the use of EIA and the degree to which it is helping to achieve the desired results. This is due partly to the difficulties of collecting systematically recorded information from many developing countries where the institutional structure are still under funded.

The lack of the clear procedure or methodology for EIA, together with a lack of trained EIA practitioners and guidelines, limited the effectiveness of EIA under the environmental (Protection) Act 1986, despite of the creation of Department of Environment in 1980 and the Ministry of Environmental and Forest in 1985. In many cases, it appears that the process of producing the EIR started after the completion of DPR which meant the potential of feedback into the project-design process was minimal. (Banham et al, 1996)

Gopalan (1992) stated that, in India, many EIRs were prepared using checklist in a mechanistic way that did not reflect or predict the true environmental impacts. Valappil et al. (1994) reviewed a number of EIRs and found the content to be inadequate in most of the cases. The lack of any independent review process (in effect the MOEF Environmental Appraisal committees were assessing the work of the Ministry's own Impact Assessment Division) may have been one reason why the necessary incentives for quality improvement were not in place.

The main issues are: -

Regulatory versus Management Tool

Environmental impact assessment is to be introduced as both regulatory as well as management tool to ensure an environmentally sustainable project.

Legal Framework

There is a need to strengthen the enforcement mechanism for the implementation of the provisions made in EIA report

Environmental Impact Assessment Evaluation Period

There is a need to specify the time requirement in each step in EIA process. It would provide confidence to the operators

Review Process

There is a need to have clear guidelines for review process, which would facilitate the removal of conflict of interest in the review panel. Representatives from Non Governmental Organizations (NGO's) should be included in the review panels.

Implementation Mechanism

The implementation mechanism is needed to be strengthened by using effective regulatory provisions, extending economic incentives, or keeping provision for environmental guarantee funds which can be used to pay damage caused or for rehabilitation necessitated by a project.

Baseline Data

Lack of availability of baseline data increases the cost of preparation of EIA/EMP. In some cases even though available, it is either not in useful form or reliable.

Regulatory Monitoring

There is a lack of post-project monitoring of environmental condition to observe the compliance of performance committed in the project report. Most proponents do not submit the required periodic status reports.

Institutional Coordination

Lack of institutional mechanisms and coordination during the project initiation, decision-making evaluation, and implementation process fail to address and ensure environmentally sound development. Therefore, it is imperative to strengthen and ensure the institutional linkages in all stages of the project.

Public Participation

A mechanism is needed to ensure that all interested parties are participating in EIA process including NGO's. There is a need to provide training on the technical aspects of EIA, to make participation effective.

Social Acceptability

The social acceptability criteria is needed to be well defined.

Local Government

The role of the state government, regional and local authorities in the enforcement of the EIA.

Training

There is an urgent need of training and information dissemination amongst the state, regional, local authorities, and NGO's for effective public hearing and implementation of EIA.

Some existing practical gaps in the EIA procedure

The following are perceived as bottlenecks that could occur in the implementation of future NHAI projects

Gaps:

- 1) Involvement of too many agencies
 - DFO's

- Civil Administration
- Nodal Officers (State Forest Dept)
- Regional Pollution Control Boards
- Chief Conservation of Forest (State)
- Ministry of Environment and Forest (Forest)
- Ministry of Environment and Forest (Environment)

2) Inadequate Power with state agencies

3) Impractical laws Enforcement is difficult and resources are constrained

Recommendations suggested in the literature

Need for one window clearances. Presently one has to run from one office to the other to get environment and forest clearances. It is for consideration that one window clearances system be institutionalized by MOEF to reduce the time frame for getting the clearances.

Need for monitoring agencies. The literature survey revealed an urgent need to create an in-house capacity for monitoring and implementing EIA/RAP. Until such a capacity is created in project authority (NHAI), the projects could hire consultants to carry out this task.

Need to expedite Land Acquisition: Based on the past experiences from the different project across the country, it is visualized that the land acquisition is likely to cause delays. In order to complete the construction in time and to restore the trees, it is recommended in the literature that suitable steps be taken to expedite the land acquisition.

4.5.6 Available Guidelines for the EIA of Road Projects in India

Literature on EIA's of the road projects along with the guidelines that are required to be followed for Environmental Impact Assessment of Highways have been reviewed, to identify the parameters that are required to be studied. The likely impacts of the project on the environment for road improvement projects are also identified.

4.5.6.1 Guidelines For EIA Of Highway Projects (IRC-1988)

The Indian road congress (IRC) has prepared guidelines for the Environment Impact Assessment for highway projects. It requires the existing traffic situation, the existing situation of the area, the land use and the status of natural resources to be studied. It emphasizes on that if a "no action alternative" is discussed.

Although these guidelines cover many aspects, it is not comprehensive in that it makes no mention of the threat to surface and ground water sources, the threat to aquatic life and the impacts on human settlements.

4.5.6.2 Guidelines for EIA of Road/Rail/Highway Projects (MOEF-1989):

The ministry of environment and forest guidelines covers many more aspects than the IRC guidelines. It specifies an area of 10 Kms. On either side of the road has to be studied. These guidelines require the impacts on the physical and ecological resources, human use, quality of life and values to be examined. It contains a detailed questionnaire for an environmental appraisal and emphasizes the necessity of showing the environmental characteristics on the both side of the road spatially. The guidelines also contains the checklist of environmental parameters associated with the transportation sector projects and mentions the need for suggesting mitigation measures. However, the

guidelines do not cover anything about the economics of the projects, traffic analyses, nor the need for the project

4.6 EIA of Road Infrastructure Projects

4.6.1 Types of Impacts

Environmental impacts arising from road development projects fall into three categories:

- Direct impacts
- Indirect impacts
- Cumulative impacts

These three groups can be further broken down according to their nature into

- Positive and negative impacts
- Random and predictable impacts;
- Local and widespread impacts
- Temporary and permanent impacts
- Short and lone term impacts

Direct impacts

Directs impacts are caused by the road itself –that is to say, by road building processes such as land consumption, removal of vegetation, and severance of farmland. For example the removal of gravel material from a borrow pit, for use in surfacing the road is an obvious direct impacts of road construction. In this case, the land area in which the pit site is located has been directly affected by the activities associated with the road projects

Direct impacts are generally easier to inventory, assess, and control them in indirect impacts, since the cause effect relationship is usually obvious

Indirect Impacts

Indirect impact (also known as, secondary, tertiary and chain impact) are usually linked closely with the project, and may have more profound consequences on the environment than the direct impacts. Indirect impacts are more difficult to measure, but can ultimately be more important. Over time they can affect larger geographical areas of the environment than anticipated. Examples include degradation of surface water quality by the erosion of the land cleared as a result of a new road, and urban growth near a new road. Another common indirect impact associated with the new road is increased deforestation of an area stemming from easier (more profitable) transportation of logs to market or the influx of settlers.

Environmental impacts should be considered not only as they pertain to road rights of way, but also to sites associated with the road project which includes deposits and borrow sites, materials treatment areas, quarries access roads, and facilities provided for project workers. These "off -ROW" areas are often where indirect impacts appear.

Cumulative Impacts

These impacts can generate additive, multiplicative, or synergetic effects, which can then result in damage to the function of one or several ecosystems (such as impairment of the water regulation and filtering capacity of a wet land system but construction of a road across it), or the structure of an ecosystem (such as placement of a new road through a forest leading to immigration or land clearing which results in severe structural loss to the forest).

A cumulative impact, in the context of road development, might be the deforestation and eventual erosion of the roadside pullout.

Positive and Negative Impacts

Environmental impacts some times have both positive and negative effects, some impacts can positively affects some peoples and negatively effect others in the same environment. For example, rechannelling streams as part of road construction might improve drainage for a roadside farmers, but wreak havoc on the livelihood of others who depend on the aquatic species disturbed by the rechannelling.

Positive outcomes that occur as result of project completion typically includes improved access, reduced travel time and cost, and perhaps reductions in accidents or noise. Other positive outcomes can be designed into a project, for example, improving water retention for local use, flood control or, providing better facilities for pedestrians and bicycles. In some cases, positive impacts can appear without having been initially foreseen by the road agency, such as a use of borrow sites for water livestock in dry areas.

Short and Long Term Impacts

Short-term impacts are those which appear during or shortly after construction; long term impacts may arise during construction, but many of their consequences appear during the operational phase, and may last for decades.

Temporary and Permanent Impacts

Temporary impacts are those whose occurrence is not lasting, and which will eventually reverse themselves, the affected system having returned to its previous state. An example of this type of impacts might be the trampling of roadside vegetation during resurfacing; it recovers after a few weeks to the point where no change from the original state is observable. Permanent

impacts are those which are irreversible-the affected system will not return to its previous state on a human timescale

4.6.2 Impacts on Soil

Soil is an important component of the natural environment, and is a primary medium for many biological and human activities including agriculture. Its protection in relation to road development deserves considerable attention.

In the road itself, in borrow pits, or around rivers and streams, there are many places where damage might occur. Losses can be considerable for the road agency and others. This includes farmers losing crop and land, fishers losing income because of sedimentation in rivers and lacks, and road users being delayed when road embankments or structures collapse. The cost of correcting these problems are often many times greater than the costs of simple preventive measures.

The impacts on soil broadly includes:

- Loss of productive
- Contamination of soil
- Erosion
 - Destabilization of slopes
 - Site tipping of spoil materials
 - Water flow diversions

4.6.3 Impacts on Water Resources

No matter where a proposed may lie, it must intersect a drainage basin, and where this intersection occurs, alteration of the local hydrology is

inevitable Road development can lead to three types of modification to the natural hydrological environment

These are discussed below

Surface water flow modification

Roads that intersect drainage basins generally modify the natural flow of surface water by concentrating flows at certain points and, in many cases, increasing the speed of flow. Depending on local conditions, these changes can contribute to flooding, soil erosion, channel modification and siltation of streams. These effects are often felt well beyond the vicinity of the road

Ground water flow modification

Road drainage and excavation can lower the water table in surrounding areas while embankments and structures can raise the water table by restricting flow. The potential effects include deterioration of vegetation, increase susceptibility to erosion, loss of water for drinking, as well as agricultural use, and habitat changes for fish and wildlife

Water quality degradation (surface and ground water)

Sedimentation, changes in biological activities in streams and on their banks, uncontrolled construction activities and spills of chemicals and pollutants can all have adverse effects on road side water quality. Chronic pollution of surface runoff from exhaust emissions, pavement, and tire wear, petroleum product drippage and corrosion of metals may be issues on some very busy roads.

4.6.4 Impacts on Air Quality

Air pollution from road traffic should be considered for all projects in which a new road, or in a change in capacity of an existing road is proposed

As well, construction related air pollution needs to be evaluated for every project undertaken

The impacts on: -

Human health

The health impacts of motor vehicle air pollution are difficult to quantify and, hence, difficult to value in economic terms. In many cases, establishment of direct cause-and-effect linkages between localized automotive air pollution and specific illness is problematic.

Flora

Plants, domesticated and wild alike, are affected both physically and chemically by air pollutants. Dust settles on leaves and can interfere with pollination and photosynthetic function if the accumulation is significant. Acidification of can interfere with nutrient uptakes by routes, thus affecting growth.

Fauna

Some faunal health problems have been connected to air pollution, as in humans, the problems are mostly respiratory in nature, acidification of aquatic ecosystems has definite implications for the health of aquatic species.

Built environment

Objects in use by humans are vulnerable to air pollution on two fronts: staining and corrosion. Acid deposition associated with NO_x and SO_2 is especially destructive of limestone, marble, or lime mortar structures. Acidity originating in vehicle emissions is also blamed for deterioration of paints and accelerated corrosion of metals.

4.6.5 Impacts on Flora and Fauna

Direct impacts

- Habitat loss
- Habitat fragmentation
- Corridor restriction
- Aquatic habitat damage
- Interruption of biological cycle

Indirect Impacts:

- Accessibility
- Ecological disequilibrium
- Contamination of biota
- Fires.

4.6.6 Impacts on Communities

Communities owe much of their vitality to the ease of with which economic and social interactions take place. Ironically, while roads are central to this continuing interaction, the introduction of a new road, or the widening of the existing road may well cause disruptions to local interactions, which outweigh the benefits. With poor planning this can be as true of the local road improvement as it is of the new highway. Properly planned, however, both should bring benefits to surrounding communities, for example, through lower transport costs, better access to market, goods, jobs, or services such as health and education. Admittedly, in the case of some major highways and freeways, the benefits may accrue mainly to lone distance travelers and haulage companies and their customers, while benefits to the local community may be minimum.

4.6.7 Impacts Arising from Land Acquisition

Road development often requires the procurement of privately owned land. This land has to be acquired by the government from its current owner while it is sometimes possible to negotiate the price for voluntary sale of a property, governments often have to use their rights to compulsory acquisition (expropriation) of properties for public projects. By its nature, expropriation causes economic loss, and social and psychological disruption for the affected individuals and their families. Naturally, the greater the number of people involved, the greater the disruption and loss.

A Government's rights to expropriate carries with it responsibility to ensure that those affected do not bear an unfair share of the cost of the project which will bring benefits to the others. In the simplest terms, this responsibility should be to ensure that the standard of living of all affected persons is restored to the level enjoyed before the commencement of the road project. To the extent that a government is successful in restoring those living standards for all affected, the adverse impacts have been minimized and possibly obviated. The mitigation plan often involves resettlements. Depending on how well the resettlement is planned, it may go a long way in compensating for the loss and disruption, or it may exacerbate the suffering.

The social and psychological impacts and associated costs are more complex, and they are often much more devastating. Neighborhood can be disrupted and, in the worst instances, broken up completely by large construction projects.

People who meet on a daily basis and who constantly do each other small but important favours may be left deprived when separated by physical barriers or long travel distances. There are also social and psychological costs associated with disruption to business. Business peoples may find their established clientele cut off from their shops or experience change in business practice.

4.6.8 Impacts on Indigenous People

Roads are very crude instruments of economic and social change. Nowhere is this more evident than in areas inhabited by indigenous peoples. The cultural, social, political, and economic integrity that characterizes indigenous peoples renders their lives extremely vulnerable to disruptions from outside. Whether a road is being planned to cross an area inhabited by indigenous peoples or to open up that same area, people have a marked effect on their lives.

Road planners have to realize that while a road will create some opportunities, it will more likely thrust indigenous people into an artificially accelerated development stream.

This situation will affect social cohesion, reduce psychological effects on the individual, and have a negative impact on individual perceptions of self-worth. Road planners, working closely with indigenous community representatives and sociologists, must attempt to enable indigenous people to adopt at a pace and in ways that they can manage and control.

4.6.9 Impacts on Cultural Heritage

The term cultural heritage, also termed cultural property, refers to sites, structures, and remains of archeological, historical, religious, cultural, or aesthetic value.

The road projects may have the following impacts on the cultural heritage. Damage caused by road construction, related works such as quarries and borrow pits, and unregulated access to cultural heritage sites. Such damage could affect the historic, scientific, social, and amenity value,

Aesthetic impacts on cultural monuments and archeological sites,
Positive impacts on the amenity value arising from improved access to sites recognized for their cultural values and on the scientific, historic and social values arising from the addition of interesting sites previously unknown or overlooked, and the updating of the region's heritage

4.6.10 Impacts on Noise Environment

In many areas, noise is one of the most obvious impacts of daily road use. However its effects are often given lower priority than economic or other environmental impacts.

Road noise impacts - Noise associated with road development affects the environment through which roads pass by degrading the human welfare, by sonically vibrating structures and by disrupting wildlife

Human welfare

Even when it is not perceived consciously, chronic exposure to road noise can affect human welfare in varying degrees, both physiologically and psychologically. Chronic noise exposure can be a source of annoyance, creating communication problems and leading to elevated stress levels as well as associated health effects

Vibration

The vibration induced by the resonance by the traffic noise can have a detrimental effect on structures standing near the roads. This is of particular concern in the case of cultural heritage sites which may have been standing for many centuries, but which are not designed to withstand such vibration. Make shift or lightly constructed buildings common in many developing countries may be the first to succumb to vibration damage

Wild life disturbance

Noise may prevent many animal species from approaching or crossing road corridors because they are afraid. As a result road corridors become barriers to regular wildlife travel routes, effectively rendering roadside habitat areas inaccessible to some species. Such disturbance reduces the success of these species and contributes to the ecological alteration.

4.6.11 Impacts on Human Health and Safety

Nowhere is impact prevention more important than in the area of road safety and human health. Poor planning can lead to loss of life, which can neither be mitigated nor adequately compensated.

Road projects often have serious negative consequences for health of local population. By encouraging direct contact between previously dissipating areas, roads provide ideal corridors for the transmission of disease between humans, and from plant and animal to humans. It is also possible that some form of air and water pollution will occur as a result of road development.

Safety is an issue that must be addressed, since road accidents will result in death, injuries, and damage to the property. Pedestrians and non-motorized vehicles are the most vulnerable users of roads, and are at greater risk of being injured by the accidents.

to evaluate the net environmental effects of a project and make trade offs in selecting among different route alternatives

To solve this trade off problem, a technique is proposed to transform all parameters into commensurate units. This new approach basically consists of three steps.

- Transforming parameters estimates into Environmental Sensitivity value
- Weighting of different Environmental Parameters on the basis of predefined criteria
- Obtain Environment Sensitivity Index

For quantitative variables such as water or air quality “Very Bad” could be the maximum permissible concentrations established by law, While “Very Good” could be the background concentrations found at great distances from sources.

Impact Assessment can produce a great deal of quantitative information. Often about very different processes and systems. The end product can be a great many measurements, a wide variety of units. The comparison of the alternatives is very difficult under such circumstances, especially when the decision makers and the public are not able to judge the importance of different levels of various variables. Hence, there is a real need to establish a common base to which all quantified measures are converted, a process known as scaling.

Scaling usually requires quantitative data; qualitative information cannot be used with many of the scaling procedures, especially given the subsequent mathematical manipulation of the information. Consequently if an impact assessment contains a great deal of qualitative information it might not be brought into the technical evaluation process.

The use of weights (Importance factor) is not perfect but it helps to quantify value judgments. The chief element of dispute is whether the task should be done by the specialist or laymen. In the former case the views may not reflect those of the public directly affected by the action; in the latter case, the non-specialist may not have sufficient factual information for impact assessment. For example, laymen have no bases for comparing the nutritional value of the oranges, Apples and pears, although they could be asked quite appropriately to rank the flavors.

4.7.1 Proposed New Model for EIA of the Road Projects

The guidelines given by the MOEF and IRC list the Environmental parameters to be considered but do not specify any methodology that needs to be adopted for making an impact assessment. Nor do they have any scale on which the impacts can be measured. Hence, it would be necessary to first evolve the methodology that can be followed and to assess the probable impacts on a weighted scale. The proposed framework for the methodology is shown in the figure.

4.7.2 Framework for the Base Line Studies

The baseline studies of the existing environment are an environmental inventory that serves as the basis for evaluating the potential impacts on the environment, both beneficial and adverse, of the proposed action. It is a description of the environmental setting of the projects and an initial step in the Environmental Impacts Assessment process.

The base-line study includes the existing transportation features of the area and the study of the physical, biological, socio-cultural and cultural environment. It consists of

Study of the existing road network and traffic characteristics

The following need to be studied

- Status of roads
- Lengths and Right of Way (ROW)
- Carriageway width
- Road condition and road side facilities like street lights, drains, etc
- Traffic volumes of different modes of vehicles and annual increase rates
- Origin and destination
- Traffic composition- Fast and Slow moving
- Speed of vehicles, traffic comfort and convenience, delays, etc
- Accidents

4.7.2.1 Study of the Physical Environment

Land. land is a very scarce commodity that should be utilized in the optimum way. There should also not be pollution of land through the discharge of toxic wastes nor should there be any loss or reduction of its fertility.

Topography: the topography of the land should, as far as possible, not be disturbed as any cutting and filling would increase erosion and affect slope stability. A change in the topographical features would also affect the drainage pattern and consequently the hydrological balance.

Land- Use. the land use around the project would be affected in different ways. Settlements and residential areas can be affected in the positive and in a negative way. Industries would possibly be attracted to location with better access and facilities. Recreational locations with improved access and facilities would receive a boost as would tourist centers. Areas with potential for recreational activities and tourism need to be identified. A study of the existing land uses of the region and their potentials are also required.

Soil. In the physical, and chemical characteristics of the soil needs to be established to know their productive values for agriculture, their susceptibility to erosion and the availability of the material for construction.

Geology: It would be necessary to see if the projects lies in an earthquake prone zone or over any fault plan. This should be avoided where possible.

Air: The existing sources of pollutants, i.e., domestic, industrial and vehicular, need to be identified to evaluate whether the concentration of any pollutants would be above the maximum prescribed standard. Air pollutants can affect the health of the people exposed to it and the surrounding vegetation.

Noise: It is necessary to know the existing noise levels in different areas of the region to see whether they are likely to change with the project.

Water: Water is a necessity for the human life and is the scarce resource. Any development activity is needs to be planned in such a manner that the water environment is protected and sustained. The quantity and the quality of the surface water as well as the ground water as it exists needs to be known for the purpose. The drainage pattern should also be studied.

Climate Rainfall, temperature, humidity, wind speed and direction are required for assessing the impacts of the project on the environment

Processes Natural processes like siltation, erosion and flooding are to be studied to establish their existing rates. These rates would then need to be compared with the rates during and after construction stage of the project to see if there would be any significant impacts

4.7.2.2 Study of the Biological Environment

Flora and Fauna: An inventory of the various indigenous and exotic species of flora and fauna in the region needs to be done along with areas of higher densities of these species as well as important habitat zones. Any endangered or threatened species in the region should be given special attention.

Specific ecosystems. These include forests, wildlife and birds sanctuaries, national parks, biosphere reserves, wetland, etc. These need to be studied in the terms of floral and faunal species, the functions they perform, activities within the ecosystems and factors that would affect the stability of the ecosystems

4.7.2.3 Study of the Socio-economic and Cultural Environment

This is a study of the people living in the area, their occupation, their socio-economic characteristics, social and cultural values, etc

Demographic and socio-economic characteristics:

These include settlement population, their growth rates, occupational pattern, literacy levels, etc. Any large-scale project would affect social

and economic development, beneficially or adversely, and hence a study of this is necessary

Physical and Social Infrastructure:

The existing education and health facility as well as potable drinking water, accessibility and communication facilities in the settlement needs to be inventoried. This is necessary to see whether the proposed project would create any additional stress on the existing facilities or if it would benefit the people.

Religious, historical, recreational, and cultural important areas:

Areas of the local importance along with the other areas identified by the ASI or the State Department of Archaeology needs to be located. Areas with aesthetic importance and potential areas for tourism and recreation are also need to be identified. These areas, depending upon their accessibility and proximity to the project would be impacted beneficially or adversely.

4.7.2.4 Description of the Proposed Project

The factors that will have to be studied for the highways are

Road factors. Land width to be acquired, maximum slopes, camber and alignment.

Traffic characteristics. The volume of various modes of traffic expected to run on the highway and their speeds.

Other features. Point of entry, facilities provided, maintenance, labour force required, number of bridges, culverts, overpasses and underpasses.

4.7.2.5 Division of the Project into Project Components

The highway projects can be divided into three Phase

- Pre-Road Construction Stage (Planning and Design Phase)
- Construction Phase
- Operation Phase of the Highway

The main components for the each phase is identified in the evaluation matrix

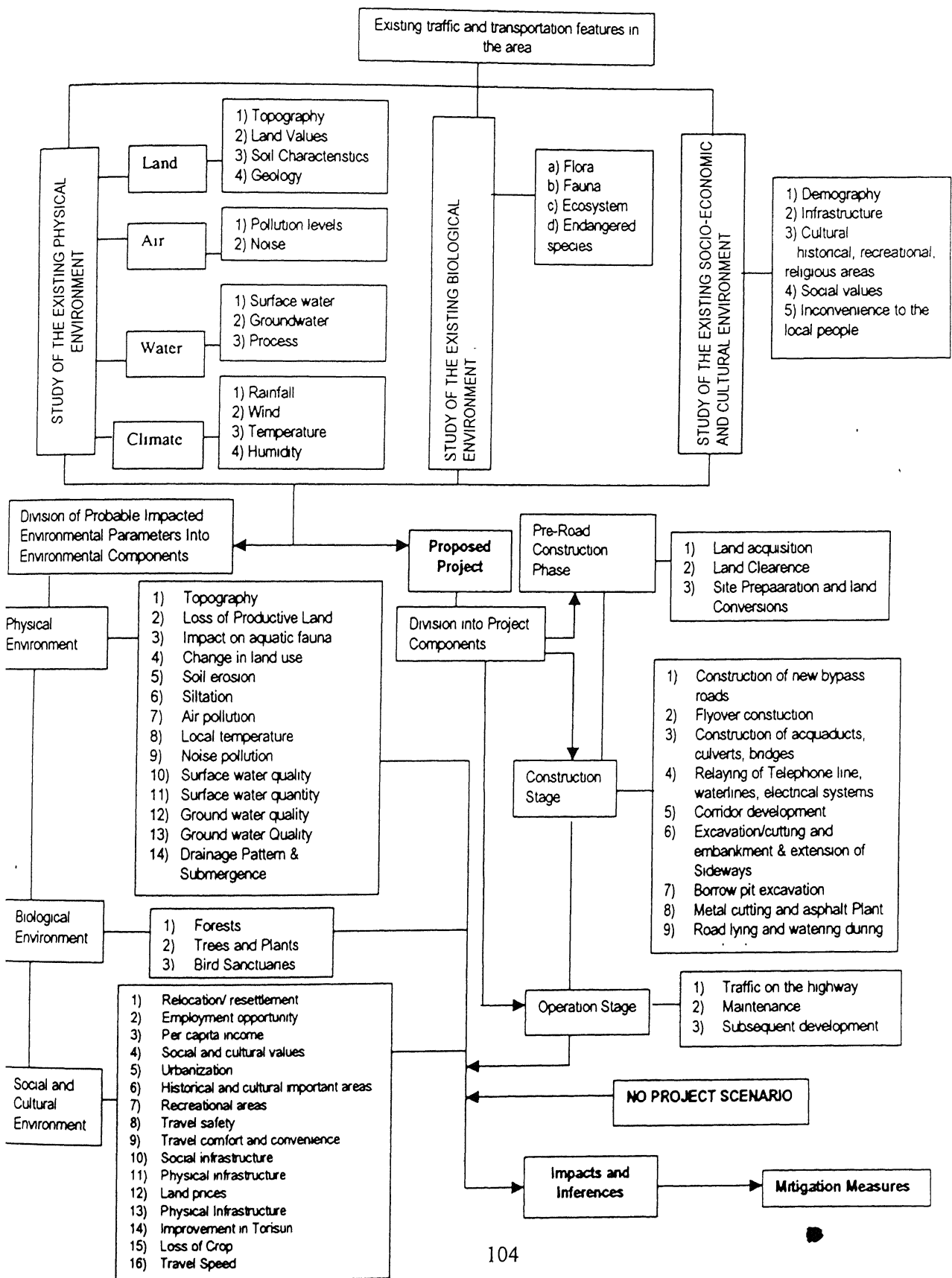
4.7.3 Division of the Probable Impacted Environmental Parameters into Environmental Components

The various environmental parameters are broken into environmental components and a matrix is prepared for the evaluation of the impact. The matrix considered for the evaluation of impacts by the new method for highway projects consists of the Project activities on the X-axis and the Environmental Components likely to be affected by these activities on the Y-axis. Each cell of the developed matrix represents a subjective evaluation of the impacts of a particular activities on a particular component, in terms of the magnitude and the importance.

The detailed Impact identification matrix is shown in the table:

4.7.4 The Framework of the Proposed methodology

The environment is a complex system consisting of physical, biological, and social resources. Uses of these resources by man have both beneficial and adverse impacts on the environment. Evaluations of these impacts are an important but often difficult task.



Highway and road development projects may create both beneficial and adverse impacts on the environment. Because properties of the environment are not commonly measured in commensurate units, it is difficult to evaluate the net environmental effects of a project and make trade offs in selecting among different route alternatives. To solve this trade off problem, a technique is developed to transform all parameters into commensurate units.

The new approach basically consists of three steps.

- Transforming parameters estimates into Environmental Sensitivity value (ESV) using quantification tables prepared for each parameter
- Weighting of different Environmental Parameters on the basis of defined criteria
- Obtain Environment Sensitivity Index (ESI) for the Alternative

Mathematically it can be expressed as:

$$ESI = \sum_{i,j=1}^n (ESV_{ij}) W_{ij}$$

here,

ESI = Environment Sensitivity Index (ESI)

ESV_{ij} (m_{ij}) = Environmental Sensitivity Value (ESV) of the j^{th} Action on the i^{th} environmental parameter I

W_{ij} (w_{ij}) = Importance of the j^{th} action on the i^{th} environmental component parameter

4.7.5 Indicators for Environmental Components and a Scale for Evaluation

Since most of the time the availability of the information is limited, many of the impacts on the environmental components can be assessed indirectly using certain indicators. Whenever possible, these indicators directly show the impacts, and where not possible surrogates can be used, which would indirectly measure the impacts.

For some of the indicators, a scale on which the impacts can be measured has been developed. For more appropriate scale for each of the parameters the help of expertise in the environmental field can be taken. For that a scale based upon the criticality of the value of the various indicators can be adopted and where there are no standards prescribed, or where indicators are subjective, one can take a scale based on a percentage change of impacts, relative to a no project scenario.

The scale varies from zero to five for positive impacts and from –five to zero for the negative impacts.

4.7.6 Development of a set of Weightages

The Environmental components are all not equally important. To establish the relative importance of each component, a set of weightages need to be developed. The weightage given for each environmental component developed for the study is based on one or more of the following parameters:

- Area affected
- Number of people affected
- Utilisation/importance /value
- Nature of the Impact

Certain environmental components would have only one parameter while others would have two or all three. Where more than one parameter is used an

[illegible]

Table: 4.4 Impact Identification Using Proposed Methodology

average value has been taken, e.g. for forest, only the last parameter of quality/value/importance will apply, where for water quality, all the three parameters would apply. The weightage factors for each parameter are given below in Table

Table 4.6 Weightage Criteria for Environmental Components

Weightage	Area Affected	People Affected	Quality/ Utilisation/ Value	Nature of Impact
1.0	>25%	>25%	Very good/High	Permanent
0.9	20-25%	20-25%	Good	-----
0.8	15-20%	15-20%	Moderate	-----
0.7	10-15%	10-15%	Poor	-----
0.6	<10%	<10%	Very Poor/Low	Temporary

4.7.7 Assessment of Impacts:

The impacts of the project components on the environmental components can be quantified by ranking the impacts on the scale developed. Positive as well as negative impacts are to be identified. The indirect impacts if not quantified are to be identified.

4.7.8 Mitigation Measures

Based on the adverse impacts on the environment due to various project components, mitigation measures are to be suggested. These would be both short-term measures for Pre-Construction & construction as well as the operation phase.

4.6.10 Advantages in the Proposed Methodology for EIA

- The methodology can be applied in the evaluation of the project impacts to select specific alternatives and in the planning process to minimize the potential adverse impacts in future projects. It will be easier for the project evaluator or decision-maker to compare between the various alternatives available.
- The suggested representative methodology can work as a standard for the quantification of the impact so that the uniformity can be ensured between different EIA's.
- The results produced by the new methodology will be easier to replicate.
- Involving experts, who will guide to standardize the quantification part for the various environmental parameters, can ensure the objectivity in EIA practices.
- With the help of the computer the quantum of work can be reduced significantly as quantification and importance assignment for various parameters can be done easily.

Chapter 5: REHABILITATION AND RESETTLEMENT R&R POLICIES OF THE ROAD PROJECTS

In view of the fact that the road development projects always result in displacement of people and loss of income due to loss of crop fields, the Project Authority should aim towards an appropriate R&R policy to compensate the losses to the affected people. Thus in this chapter the R&R policy associated with the road sector projects in particular as well as the general R&R policies of the Government are being discussed.

5.1 Displacement- An Overview

Displacement is an age-old practice of our civilization. It is caused either due to war, or due to conquest or due to induced development activities. There is evidence of development-induced displacement already from the age of the Guptas in the 3rd to the 6th century A.D. It seems to have continued to some extent in the Mughal age but increased under the British rule in India i.e. from the first coal mines in the 1820s in Raniganj, to the coffee plantations in Karnataka, tea plantations in Assam, construction of the Grand Trunk Road in the 1830s, creation of the Public Works Department in the 1840s and other projects later. The colonialist needed more and more land in order to change the Indian economy to suit the needs of the British Industrial Revolution. All those efforts culminated in the *Land Acquisition Act 1894*. Other laws and policies followed, around land and forests and all of them resulted in direct or indirect displacement of people. It had been further intensified after independence, thanks to the industrial policy enunciated in 1947 and the five-year plans launched in 1951. These measures have resulted in much more displacement than in the colonial times with the difference that now it is in the name of national development (Chary, 1999). However, the displacement and rehabilitations involved in the road projects are usually of

some typical nature. Major impacts of the road projects are associated with the Right of Way (ROW) clearance.

5.2 Resettlement and Rehabilitation Policy

Even though sectoral R&R policies existed in our country, till date, India has no national resettlement and rehabilitation policy. Only three States, Maharashtra, Madhya Pradesh and Punjab, have statewide resettlement and rehabilitation (R&R) policies. The Maharashtra Project Affected People's Rehabilitation Act of 1976, amended in 1986, is the most comprehensive one. Other States have issued Government Orders or Resolutions, sometimes sector-wide but more often for specific projects. Two public sector premier national parastatal companies, viz. the National Thermal Power Corporation (NTPC) and Coal India Limited (CIL) being committed to the cause of the poor, had issued R&R policies consistent with the World Bank's OD 4.30. These policies affected other projects across the nation. Many organizations in India have lobbied for a national rehabilitation policy.

While there is no national resettlement policy, land acquisition in India is covered by a national law, the 1894 Land Acquisition Act (LAA) and its subsequent amendments. The LAA allows for land acquisition in the national interest for water reservoirs, canals, plants, fly-ash ponds, transmission lines and highways to be carried out by the respective States in accordance with its provisions. Under the LAA, compensation is in cash for the loss of land, other productive assets (such as standing crops and fruit and fodder trees), house plots and residences.

Resettlement in India as well as in other countries is governed by general or project-specific government directives issued from time to time.

Some of the directives are innovative in recognizing that some landowners benefit from a project and recovering at least a part of the costs from such land acquisition. For example, some road projects in Korea require the landowners to surrender a part of their holdings along the road corridor and do not compensate for the land taken because the value of the remaining land will appreciate considerably due to the road. However, many of the directives seem to offer inadequate strategies for reestablishment and restoration of income of displaced peoples. The provisions may have been influenced by government policies and practices, the demands of affected persons and non-government organizations (NGOs), as well as the advice provided by aid agencies assisting in projects.

The World Bank was one of the first international development aid agencies to formulate a policy on involuntary resettlement. The policy was first issued as an internal Operational Manual Statement (OMS 2.33) to their staff in February 1980. Since then, it has been revised and reissued a number of policy directives; One of the most recent one is the Operational Directive (OD 4.30) of June 1990, it remains one of the most comprehensive resettlement policy statements. It describes the World Bank's policy objectives on involuntary resettlement as well as measures the borrowers are expected to take in operations involving resettlement. It also gives specific information on the review procedures that World Bank staff should follow for projects involving resettlement components.

Objectives of the World Bank's OD 4.30 - Salient Points

- a) Involuntary resettlement should be avoided where feasible or minimized, exploring all viable alternative project designs such as realignment of roads may significantly reduce resettlement needs.

- b) Where involuntary resettlement is unavoidable, resettlement activities should be conceived and executed to maintain sustainable development, to provide sufficient investment resources so as to give the persons displaced by the project an opportunity to share the project benefits. Displaced persons should have opportunities to participate in designing and implementing resettlement programmes through participatory planning approach.
- c) Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to beginning of project implementation, whichever is higher. The displaced persons should be:
 - (i) compensated for their losses at full replacement cost prior to the actual move, (ii) assisted with the move and supported during the transition period in the resettlement site and (iii) assisted in their efforts to improve their former living standards, income earning capacity, and production levels, or at least to restore them. Particular attention has to be paid to the needs of the poorest groups to be resettled.
- d) Community participation in planning and implementing resettlement should be encouraged. Appropriate patterns of social organization should be established, and existing social and cultural institutions of resettlers and their hosts should be supported and used, to the greatest extent possible.
- e) Resettlers should be integrated socially and economically into the host communities so that the adverse impacts on host communities are minimized. The best way of achieving this integration is that the resettlement be planned in areas benefiting from the project and through consultation with the future hosts.
- f) Land, housing, infrastructure, and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities,

and pastoralists who may have usufruct or customary rights to the land or other resources taken by the project. The absence of legal title to land by such groups should not be a bar to compensation.

5.3 Difficulty in Land for Land Option in Road Projects

In most of the cases, the highway passes through fertile agricultural belts, which is under private ownership. As a consequence, there could be an economic impact on a family of the PAP due to the land acquisition. As agriculture is a traditional source of income or livelihood in the villages, the land acquisition will result in loss of agricultural income. Thus, there is an urgent need for their rehabilitation.

The '*land for land*' option for PAFs having valid title or customary or usufruct right for their acquired land is considered as the most appropriate way to compensate the loss of agricultural income. However, unavailability of surplus agricultural land in the project villages and nearby areas makes this option difficult to implement. Also the small plots acquired from individual PAPs cannot be replaced due to lack of contiguous lands to supplement the land lost and purchase of such small plots at different places would not be economically viable.

In the urban areas, because of the high population density and large size of many urban areas, land costs tend to be high, even though the displaced need land primarily for housing. Because it is often difficult to find suitable land for re-housing the displaced close to their pre-displacement homes, land is found at a greater distance. Moving farther from social

networks and markets may create new financial burdens, such as increased transport costs. In such case compensating for the loss of land at replacement value is considered appropriate and is acceptable to the PAPs as a better option.

5.4 Impact Due to Right of Way (ROW) Clearance

The ROW specifies removal of all encroachment on public land, which is generally used by commercial squatters, farmers and businessmen. Hence the road project would affect a number of people squatting within the public ROW, some of whom will even be displaced. The issues involved in ROW are:

- i) Encroachments: Encroachment and the use of an apparently "unused" road reserve is a reality in India. Landless squatters and adjacent farmers alike see value in using the apparently vacant land. This can be a productive use of otherwise idle land, but can frequently cause damage to the road, either physically by excavation or irrigation, or in performance through added congestion. Historically the responsibility for control of encroachment has been unclear with police, R&B and local administrations having failed to exercise their legal powers. Whilst legally the encroachers have no right to occupation nor compensation, there is an ethical and moral obligation that their position be considered, based on long-term 'user-rights'.
- ii) Commercial Squatters: These are temporary wooden structures comprising of tea-stalls, vegetable vending, cigarette shops, automobile repair shops and those are set up in response to the consumer demand from highway traffic and the adjoining industries. The owners of the structures will lose the source of their income if the structures are removed without appropriate rehabilitation.

- iii) Residential Structures The ROW clearance will also render squatters homeless, necessitating relocation. As many of these squatters belong to the backward/ SC/ST classes, their problems need to be addressed seriously.
- iv) Impact on community utilities and structure The community structures and utilities that need to be relocated in any project as part of ROW clearance includes shifting of temples, roadside drinking water posts, toilet blocks and bus stops.

5.5 Role of Non-Government Organisations (NGO) in R&R

The NGOs are expected to be the cornerstone of the implementation stage of the RAP in every road project. The NGOs should be responsible for almost all aspects of the implementation of the Rehabilitation Action Plan RAP.

Broadly, the areas of NGO involvement will be the following.

- To verify the eligible PAPs, including supplying identity cards to the PAPs and consultation.
- To ensure that the PAPs are given the full entitlements due to them.
- To provide support and information to PAPs for income restoration.
- Assist the PAPs in relocation and rehabilitation, including counseling, and co-ordination with the local authorities.
- Assist the PAPs in redressal of their grievances (through the GRCs).
- Impart information to all the PAPs about the functional aspects of the district level programmes and assist them in benefiting from such institutional arrangements.

- Assist the Project Implementation Units (PIUs) in ensuring social responsibilities of the project, such as, compliance with the labour laws, prevention of child labourers, health, hygiene and gender issues
- To collect data and submit progress reports on a monthly basis as well as quarterly basis for Project Authority (NHAI) to monitor the progress of the RAP implementation
- The NGOs will ensure that the RAP is implemented in an effective, proper and transparent manner

The NGO will ensure that all the eligible PAPs receive appropriate and justified entitlement within the Entitlement Framework of a particular project, and that, at the end of the project R&R services, the eligible PAFs/PAPs have improved (or at least restored) their previous standard of living. Additionally, the NGOs will help the project authority in all training programmes/sessions

5.6 Resettlement Implementation and Monitoring

The following indicators are used as a sample for monitoring and evaluation

- Socio-economic conditions of the PAPs in the post-resettlement period,
- Communications and reactions from PAPs on entitlements, compensation, options, alternative developments and relocation timetables etc.;
- Changes in housing and income levels,
- Valuation of property;
- Grievance procedures,
- Disbursement of compensation, and
- Level of satisfaction of PAPs in the post resettlement period

5.7 Factors of Good Resettlement

The literature review showed that good resettlement can prevent impoverishment of affected persons and can even reduce their poverty by building sustainable livelihoods. However, inadequate resettlement induces local resistance to the project, increases political tensions, causes significant project delays, and postpones the flow of project benefits, and the benefits lost as a result of such avoidable delays may sometimes far exceed the additional cost of good resettlement.

Based on the World Bank's experience over the past 10-14 years, a number of major common factors that contribute to the success of resettlement were identified. These are (i) political commitment of borrowers in the form of laws, policies, and resource allocations; (ii) close adherence to established guidelines and procedures in implementation; (iii) sound social analysis, reliable demographic assessments, and appropriate technical expertise in planning for development-oriented resettlement, (iv) reliable cost estimates and provision of required financing, with resettlement activities phased in tune with civil works construction; (v) effective executing agencies that are responsive to local development needs, opportunities and constraints, and (f) people's participation in setting resettlement objectives, identifying reestablishment solutions, and implementing them.

5.8 Measures to be Adopted for Minimizing the Trauma of the Displacement in the Road Projects

The following measures are advocated to be adopted by Project Authority to reduce the burdens trauma of displacements.

- Design considerations and the realignment options which can be adopted to avoid or minimize displacement in the road projects
- As far as possible, concentric widening has been adopted in the built-up stretches of the corridor to minimize impact on properties or to avoid land acquisition
- Raised carriageways can be incorporated wherever possible, to minimize the impact on the roadside built-up structures. Raised carriageways require lesser width as the proposed carriageway can be segregated by vertical separation instead of wider horizontal separation
- The interest for the Non-Title holders should be given due consideration (like kiosks), which are found to be affected severely as they lost their business which is their main source of income and got nothing as compensation except the shifting allowance
- Compensation for the loss of assets needs to be at replacement value, not market value.
- Some assured benefits to the PAP's like employment, basic amenities, training, or free use of the facility created in case of the toll road projects
- Assured timely payment of the compensation should be ensured as implementing agencies are often constrained in their ability to pay compensation in a timely fashion due to bureaucratic and administrative hurdles.
- The compensation should be based on the remaining land holding of the PAP's as in most of the projects it is not at all considered that how much land is available to the farmers before and after land acquisition. Therefore

in case of the marginal farmer the amount of compensation should be increased

- The process of implementation and monitoring of rehabilitation activities associated with various road projects is rather weak and needs some consideration
- The prime consideration, which should be given during project preparation, is to avoid or minimize negative impact on the people/communities due to land acquisition
- Where the density of the population is large the better option will be to provide the bypass roads
- One side expansion within the ROW had been found to be a viable solution to minimize losses of built structures. This option will be applied wherever sufficient land had been available
- Impacts due to acquisition can be avoided by lateral shifting of the proposed road alignment at the places where land is available on the other side.
- The participatory planning with people will help in minimization of losses, saving residential/commercial structures, cultural properties, and community infrastructure (schools, colleges, governmental buildings, bus shelters, etc).
- Safety of the road users and the roadside communities had been found to be a major concern in the road projects. Underpasses should be provided to facilitate the people living on either side of the road to have access to facilities and to avoid disruption of social relations and network
- Income generation schemes will be developed with consultation of the project affected/ displaced families. The grants received for such purpose from the project, will be used for the skill development training to upgrade their existing skill, purchase of small-scale capital assets, etc. While developing the enterprise development or the income generation activities,

the NGOs should contact the local Regional Rural Banks (RRBs), the Small Industrial Development Bank of India and Lead Bank officers for financing the economic ventures. The marketing and milk federations may also be contacted for planning sustainable economic development opportunities

- There must be a comprehensive national rehabilitation policy with further modification in the Land Acquisition Act. The displaced must be involved in their rehabilitation. This must not be done through the bureaucratic approach, but through the consensus method
- The issues of human rights, environment and women's and children's problem require priority. However, there is a need to change the attitude of bureaucracy
- We need to transform our way of looking at people. Instrumental rationality treats people as human resource – a way of treating humans as objects. But it should be understood that people are not objects of instrumental rationality, but humans with subjectivity and emotions. This may discourage the emergence of vested interests in the development process (Chary, 1999)

With the background note on the R&R policies and issues involved in developing road sector projects, I propose to analyze the R&R policies of our sample projects in the following chapter.

Chapter 6: THE CASE STUDIES- VADODARA- HALOL TOLL ROAD (VHTR) AND SIKANDRA-KHAGA NH-2 EXPANSION PROJECT (SKEP)

6.1 Case Study of Vadodada-Halol Toll Road in Gujarat

6.1.1 Background of the Project:

The Vadodara - Halol Road (SH-87) which links Vadodara city to the industrial town of Halol had been identified as one of the most important State Highways in the State of Gujarat. This road forms part of the route to the states of Madhya Pradesh, Rajasthan and Delhi from southern parts of Gujarat and Maharashtra. The strategic options study of the state road network instituted by the Government of Gujarat in 1995 found out that in view of heavy traffic flow, the road needs immediate up-gradation with a view to carry out such an extensive exercise. The Roads and Building (R&B) Department, Government of Gujarat (GoG) and Infrastructure Leasing and Financial Services Limited (IL&FS) have entered into a Memorandum of Agreement to develop and implement the widening/strengthening of the Vadodara-Halol section of this State Highway (SH87) on a commercial format.

The total length of the project road is 33 km with the initial stretch falling in Vadodara and Vaghodia tahsils of Vadodara district while the remaining falling in Halol tahsil of Panchmahals district. The location of the road is shown in Figure 6.1.

Infrastructure Leasing and Financial Services (IL&FS)- awarded M/s Kirloskar Consultants Limited, Pune the job to carry out the detailed feasibility study of the widening and strengthening of Vadodara-Halol Highway project for implementation of the project on a commercial format.

This also involved the environmental viability study which included environmental baseline data generation, preparation of an integrated Environmental and Social Impact Assessment Report (ESIAR) documenting major social issues, consequent risks and the suitable action plans and also Environmental Management Plan (EMP) outlining the measures for improving the environmental quality and budgetary cost estimation for implementation.

6.1.2 Need for the Project -

The traffic studies identify that the existing two lane carriageway accommodates 18000 Passengers Car Unit (PCU) in a day, which according to standards is close to capacity. The average journey speed observed on the project road is 40 kmph which while considered with limited scope for overtaking fix the level of service as 'poor'. Delays are experienced due to cattle crossing all along the project road and pedestrian crossing at the villages. The friction due to developments at the villages contribute to the reduction in level of service and increase in accidents at these locations. The single carriageway at the current level of service where overtaking becomes risky, also contributes to the reduction in level of safety on the project road

" Both these districts also witness a high growth of Industries and Small Scale Industrial (SSI) units on a consistent pace which could be largely attributed to the attractive policies floated by the various governments. As a result of growth induced industrial policies, large scale investments have been forthcoming at a rapid rate. Addition of a two-lane carriageway with directional segregation is therefore necessary to enhance the levels of service and safety for projected future traffic".

The initial project concept involved widening and strengthening of the existing road to a 4 lane divided carriageway with a design speed of 100 Kmph and recovering the cost through charging toll. Later the project concept has been broadened to include provision of service roads to provide added benefits to the local users.

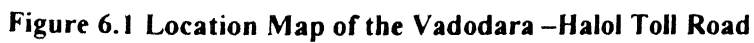
6.1.3 Planning Process Involved

The completion of the various reports need to plan the project took a 15 months. These included a technical feasibility report, traffic modeling studies, detailed engineering, environmental and social assessment and Social Management Plans (SMPs).

In the absence of a regulatory framework in India, drafting of the concession agreement was another fairly intensive exercise, it became critical for support from investors. The negotiation for finalizing the concession agreement were intense, given the lack of precedent of such contracts in the country. IL & FS had played the role of impartial umpire to balance the risk between the project company and the government of Gujarat.

In order to lend transparency to the project, a group of secretaries of the state government from the road and building and legal and finance departments, assisted by an international consultant unraveled the complexities of the concession agreement.

More than 25 force majeure and other risks were identified and allocated to each party. On its part, IL & FS required delicate handling, the VHTRL and the Government too were expected to have an understanding of the risk and the willingness to share it. There was a question of the development rights of the adjoining area. The project company naturally wanted these, whereas the government did not want to give them away as they were not covered in the initial study.



6.1.4 Comparisons of With and “No Project” Scenarios

A comparison of the "Volume to Capacity" estimation (V/C ratio) clearly reveals a steady rise of traffic densities on the existing road in the limiting and normal capacities with “No Project” Scenario. In the limiting capacity scenario, the maximum rise in V/C ratio is likely to be at 3.36 against the present ratio of 0.55 with No Project Scenario. However it was projected that, the ratio for With Project Scenario would be 1.27 in the year 2030 with respect to the existing ratio of 0.13. Whereas with the normal capacity, the rise in volume/capacity ratio is likely to be at 6.79 against the present ratio of 1.11 with “No Project” Scenario. Comparison of the traffic densities “No Project” scenario “With the Project” is provided in the following table 6.1

An Analysis of “No Project” scenario with the “With Project” has emerged the following findings:

- The projected travel time would reduce from 36.3 minutes to 24.8 minutes for each vehicle with the project,
- The project is expected to provide an average 42.3% saving in fuel requirement which will have a proportional positive impact on air quality;
- The pollution load for NO_x with the “Project Scenario” is found to be almost 1.2 to 1.79 times greater than that of “No Project Scenario”. In the mean time, “This Project Scenario” is expected to contribute a very favorable pollution situation with a reduction rate of about 12% to 55% and of about 21% to 48.6% in daily total pollution load of HC and CO respectively, and
- Moreover, the accident reduction is estimated to be 25% “with the Project”.

The "With Project" Scenario fulfils the functions of providing relatively faster and cheaper transportation, Improving traffic management and public transportation on existing roads, and providing significant socioeconomic benefits to the entire region. With the proposed improvements, in alignments and measures for environmental improvements for similar traffic flows, the project will also reduce the exposure level of air pollutants and noise in the project area.

Table 6.1 Projected Traffic Densities for "No Project" and "Project" Scenarios:

Year	Total PCU	V/C ratio Limiting capacity		V/C ratio Normal capacity		Implied Growth Rate		
		Without project	With Project	Without project	With Project	Bus	Car	Truck
1996	18356	0.46	0.14	1.11	21	-	-	-
2000	26639	0.66	0.21	1.53	28	6.9	11.82	9.36
2005	40814	1.02	.32	2.15	40	6.2	9.61	8.89
2010	59472	1.48	.47	2.89	54	5.4	8.47	7.74
2015	82293	2.05	.65	3.70	69	5.0	6.99	6.69
2020	107273	2.66	.85	4.64	87	4.7	6.07	5.72
2025	123732	3.09	.99	5.66	1.06	4.6	5.47	4.83

6.1.5 Base Line Condition

Our study area comprises of the area falling within 5 km distance on either side of the proposed and existing alignment for the study of various environmental attributes is considered. For the detailed study

an area within 1 km distance on either side of the alignment has been considered

1. Land-use Pattern

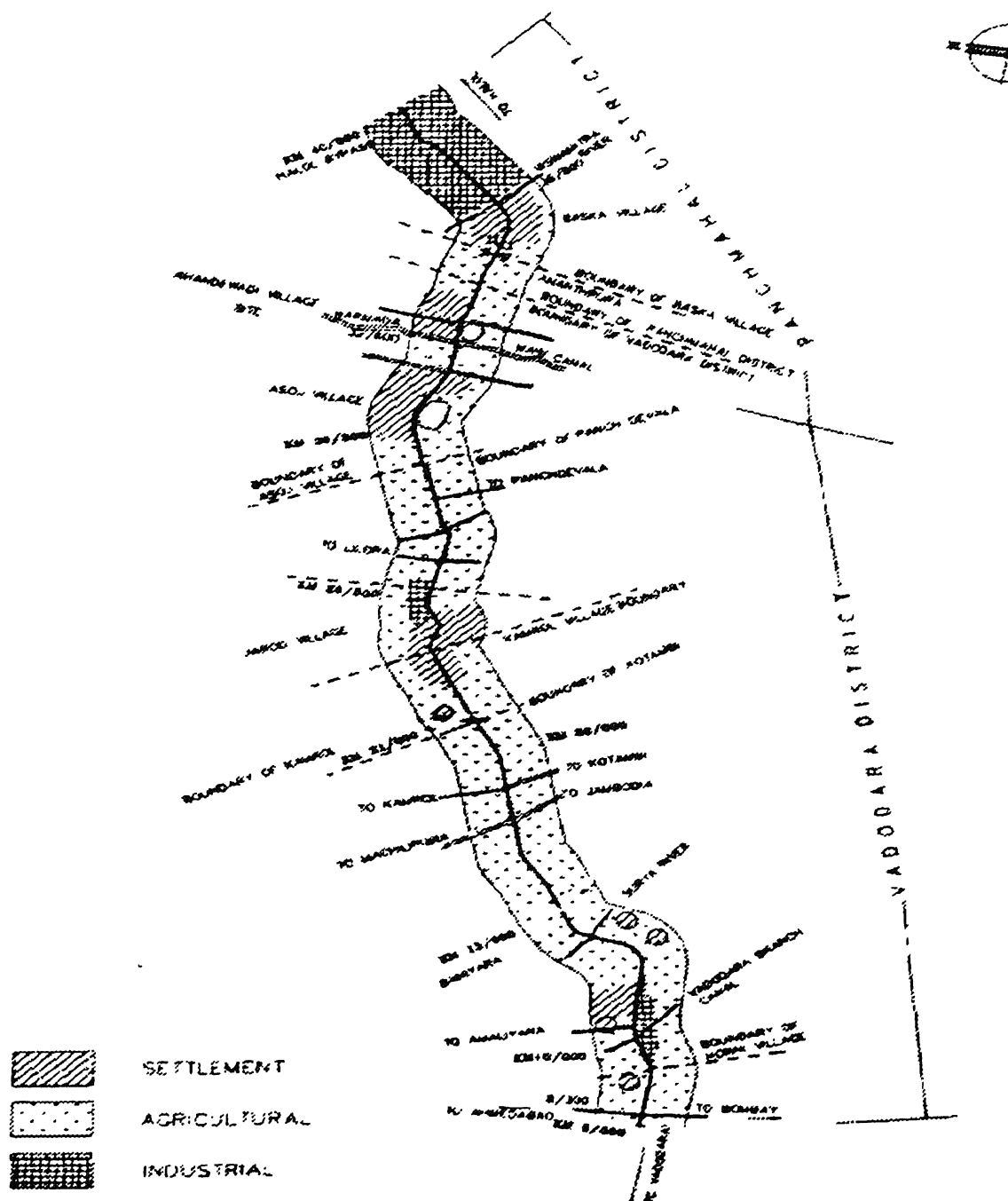
The land-use patterns reveal that nearly 90% of the length of the road is either used for agriculture or open land for grazing of cattle. However, Agriculture is the predominant land use along the road for over 20 km out of the 33 km stretch i.e. for more than 60% of the length. The detail land use pattern of the study area is depicted in figure 6.2. It has agricultural and open land as the adjoining land use.

2. Terrestrial Ecology

There is no reserved forest, national park, wild life sanctuary or biosphere reserve in the core area. Within the thirty-one km stretch out of 2821 trees recorded, 464 were small, 735 medium and remaining 1422 were large trees. The study revealed the existence of thirty-eight species in 31 km patch of the road. Among the length the large trees the highest percentage was of Neem i.e. 36%.

3. Terrestrial Fauna

Since there is no suitable habitat for occurrence of ecologically important fauna in the area, no endangered species have been reported in the study area. As the project is not passing through ecologically sensitive area, the abundance of the fauna is of less significance.



LAND USE ALONG THE PROJECT ROAD

Figure 6.2 The Land-Use Pattern in the VHTR Project

6.1.6 Project Execution

Had no previous road existed, work would have been easier. It is, after all, simpler to begin work afresh than to reconstruct previously completed work. Buildings, trees, utilities, even villages have to be partially relocated as the work progressed.

The construction phase of the project was not without its usual hiccups. The delay in clearing the hindrance (electric poles, telephone poles, gas lines, tree cutting) was the single biggest problem, but with the strong proactive support from the government of Gujarat, this was reduced to the manageable levels with no impact on time and cost.

The concerns for the environment by the actors involved every existing tree that stood on the road is replanted. In addition to that about 20 times the number of trees cut had been planted and the plant varieties selected according to the terrain and topography. With the significant degree of mechanization, the road construction work in the case of Vadodara-Halol toll road project is capital intensive rather than the man power intensive with the purpose to ensure quality.

For the first time in India a field laboratory established for VHTR project that facilitated all major test tracibility to the National Physical Laboratory of India. The latest technological equipments was used. This included a nuclear density gauges and electronic total station and auto level fitted with parallel plate micrometers.

a) Construction phase impact and mitigation measures adopted

- For the drainage big drains are made on both side of the toll way.
- For the convenience of the local traffic service lanes of width 5.5 m on both side of the toll way is constructed.
- Realignment of curves is done with the greater speed and safety as an objective and to attend the design speed on curves too.

- Around 40 houses for the displaced PAPs in a village Khandiwada is rebuilt. The houses provided are pukka houses
- During construction, local people got employment opportunity as construction labour
- In some of the villages, ponds are made for the use of live- stocks
- To avoid obstruction of route between farm and houses adequate underpasses are made

6.1.7 Project O &M Phase

The facilities at the Vadodara –Halol tollway for its O&M includes

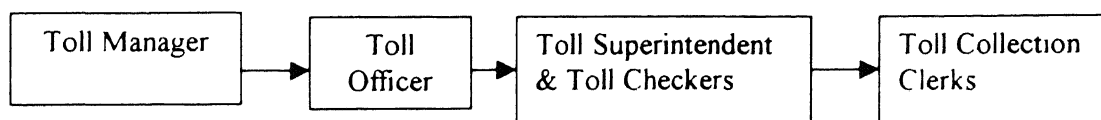
- A crane and ambulance is available 24 hours for emergency, so as to act at the time of any mishap or accident on the road, and the road is cleared as early as possible using crane to ensure uninterrupted traffic flow
- For quick medical assistance in the case of any accident one safety staff and two medical superintendents are available for 24 hours
- For the care of the planted tree at the median and on sides watering is done two times in a week in the entire stretch.
- Presently 171 employees are on regular basis and around 60 are on temporary basis for O&M including toll collection staff, maintenance staff, audit or checking staff (patrolling staff to catch offenders), security etc

- Presently approximately 6000 vehicles are passing daily by paying toll, which is less than the estimated 10,000 per day. Average of the daily traffic is shown in Table 6.3
- The toll collecting staff includes the engineers and other staff who look after the defects liability. For an efficient know-how and working training has been imparted to the tolling staff by Punj Llyod's HR division.
- For effective working assurances, cameras are placed at each of the collection booths to check the work.
- Four types of vehicles are exempted for paying tolls; they are:
 - Fire Vehicles
 - Defence Vehicles
 - Police Vehicles on-duty
 - Ambulances

Table 6.3 The Daily Traffic in the VHTL Averaged for the 15 Days

Vehicle type →	Two - Wheelers	Three- Wheelers	Four Wheelers (car)	LCV	BUS	Truck 2axle	Truck 3axle	Truck 4axle	Truck 5axle	6 axle	Additional axle
NO.s	882	167	1468	496	570	1683	352	103	4	1	1

- The toll collection staff includes (from top to bottom)-



village boundary maps depicted in 1991 Census handbooks, there are 12 villages in Vadodara (*viz.*, Hami+Dhanjipura and Amaliyara in Vadodara Tahsil, Kumetha, Bhaupura, Bhaniyara, Kotambi, Kamrol, Jarod+Jarodiyapura, Lilora, Panchdevia, Asoj+Ishwarapura and Khandewadi in Vaghodia Tahsil) and 2 villages in Panchmahals districts (*Viz.*, Bhaska+Anandpura and Nurpura), therefore 14 villages have come under in total falling within the study area. The demographic profiles are given in Table 6.3 and 6.4. The total population of the villages under consideration is estimated to be 23,598. The males and females constitute about 52.88% and 47.120% respectively in the study area. The density population reveals that the study area has an overall density of 282 persons per km². The high density of population in the study area can be attributed to rapid industrialization and urbanization in the area.

Table 6.3 Demographic features of the Population in the VHRL Project area

S No	Name of the Village	Total population			Household size	Density per Sq.Km
		Male	Female	Total		
Tehsil Vadodara (Vadodara District)						
1	Hami+Dhanjipura	-	-	-	0.0	-
2	Amaliyara	718	650	1368	4.9	283
Tehsil Vaghodia (Vadodara Dist)						
1	Kulmetha	665	618	1283	5.3	166
2	Bhaupura	286	278	564	5.4	174
3	Bhaniyara	1033	851	1884	5.3	272
4	Kotambi	1516	1416	2932	5.3	150
5	Kamrol	819	774	1593	4.6	158
6	Jarod+Jarodiyapura	2879	2683	5562	4.9	400
7	Lilora	780	701	1481	4.8	270

8	Panchdevla	351	313	664	65	256
9	Asoj+Ishwarapura	967	851	1818	47	285
10	Khandiwadi	710	496	1206	70	536
Tehsil Halol (Panchmahal Dist)						
1	Baska+Anadpura	1431	1199	2630	49	574
2	Nurpura	324	289	613	48	132
	Total	12479	11119	23578	-	282
	Sex Ratio			891		

Table 6.4 Demographical Features Caste-comparison) of the VHTR Project
Continued

S No	Name of the Village	Total Population	SC	ST	Total SC+ST	Other Cast
Tehsil Vadodara (Vadodara District)						
1	Hamil+Dhanjipura	-	-	-	-	-
2	Amaliyara	1368	174	179	353	1015
Tehsil Vaghodia (Vadodara Dist)						
1	Kulmetha	1283	19	10	29	1254
2	Bhaupura	564	50	97	147	417
3	Bhaniyara	1884	231	197	428	1456
4	Kotambi	2932	61	987	1048	1884
5	Kamrol	1593	76	53	129	1464
6	Jarod+Jarodiyapura	5562	473	589	1062	4500
7	Lilora	1481	10	410	420	1061
8	Panchdevla	664	00	00	00	664
9	Asoj+Ishwarapura	1818	40	309	349	1469
10	Khandiwadi	1206	16	252	258	938
Tehsil Halol (Panchmahal Dist)						
1	Baska+Anadpura	2630	90	186	276	2354

2	Nurpura	613	03	459	462	151
	Total	23578	1243	3728	4971	18627
%with total Population		100	5.27	15.80	21.07	78.93

6.2 Socio-Economic Environmental Impact Assessment of the Study Area

According to detailed pre-feasibility study carried out by IL&FS, the existing ROW of state highway between Vadodara and Halol is 24 m except at the curve points where it extends up to 30 m. The proposed widening and road improvements required 60 m wide strip of land at the straight sections and up to 70 m wide strip at the curves. This additional area between the existing ROW and land required for the widened (i.e. a strip of 36 m all along sections running along the existing road) and improved road is defined as "Corridor of Impact" of project that forms the base for identification of Project Affected Persons (PAPs).

The process of Social Impact Assessment involved primarily the following steps:

I -General Assessment

This process involves enlisting chainage wise all the PAPs' 'Public and Privately owned, (movable and fixed) structures, Trees (fruit bearing and non-fruit bearing) belonging to the land owners etc. and their exact distances -from the- central line of the existing ROW. The general assessment involves:

1. Identification and Profiling of PAP's
2. Development of Draft RAP (Resettlement Action Plan)
3. Public Information and Consultations (PIC):

Keeping in view the draft version of RAP an exercise is initiated

- (1) To understand in depth the sentiments and the feelings of the people losing their assets in the project area
- (2) To identify the social and environmental issues/problems at large so that no such issue remains un-addressed as well as to take care of the

problems as perceived by the people losing their assets due to project implementations

- II. *Finalization of RAP* The RAP is finalized based on the draft version of the RAP and findings of the PIC exercise
- III. *Identification of Institutional Arrangement*: As the final step of SA, institutional arrangements for efficient implementation of RAP and monitoring of its outcome are suggested

6.2.1 Assessment of Benefits From The Project

The study has claimed that all the road users, including the PAPs, will be benefited from the proposed improvement on account of comfort, safety, reduced travel time, saving on vehicle operating costs due to enhanced speed, better geometry, and smooth surface. The project will upgrade linkages to national highways and open up the area for increased economic activities. A significant economic benefit is expected from the project in the form of generation of employment opportunities during the construction activities, which will be available to the local people, including affected community.

6.3 R&R Policy of the VHTR Project

The R&R policy for the project has been formulated in accordance with the World Bank Guidelines on Involuntary Resettlement (OD 4.30) and Environment and Social Report (a policy statement on environmental and social issues) of the IL&FS. The VHRP policy takes into consideration those coming within the corridor. Essentially they are in two broad categories:

- Those with private ownership of land and other immovable assets; and

- Encroachers on government land and squatters within the corridor of impact

The main objective of deriving the entitlement through compensation and assistance to be given to the PAPs during R&R is to ensure that their standards of living is at least restored to the pre-project level and preferably improved above the levels they enjoyed before the implementation of the project. In the absence of any legal regulatory framework to government such entitlements associated with resettlement and rehabilitation projects, IL&FS has adopted its own standards for entitlement framework. The standard of IL&FS are presented below.

- a) **Loss of Structures** As per IL&FS policies, all house owners are compensated by a house of area equal to the area of the lost structure. In case the area of the house is less than the minimum government norm for single-family dwelling, a house of minimum area is provided (Indira Awas Vikas Yojana). For squatters, irrespective of the size for the present dwelling, an ownership house of minimum area as per government norm is provided. The beneficiary under this case however cannot sell the house till completion of the concession period of the project.
- b) **Commercial Structures** The only commercial structures requiring relocation are movable stalls. Hence a shifting allowance at the rate of Rs. 1000 per structure is proposed for them.
- c) **Tenants.** In the case of tenants, it is expected that they will re-establish themselves elsewhere and the IL&FS policy entitles them only for a shifting allowance. However in the present cases, the tenants belong to economically weaker sections and are living in damaged huts due to financial constraints. It is difficult to envisage that they will be able to shift to alternate accommodation and re-establish themselves. As a special case, therefore, these tenants will also be provided with a dwelling unit of minimum area. The house owner will be compensated for the land and structure based on valuation. A shifting allowance of Rs. 1000 will be provided to each PAPs.
- d) **Loss of Village Land** The public land acquired within the revenue boundary of the village can belong to either the Gram Panchayat or the Revenue Department, GoG. In case of the government land, since the GoG is a member (shareholder) and since the project (road) will be transferred back to the government, no compensation is proposed to be paid for such government lands. As the gram panchayat / government land holding is yet to be identified through JMS, it is proposed to pay a price to the Gram Panchayat for such lands at the government rate from the contingency provision.
- e) **Agricultural Crops or Tree** In case there are standing agricultural crops at the time of LA, cash compensation equivalent to one year income for crops

will be paid through contingency fund. In case of loss of fruit bearing trees, the income compensation will be for made for a period of 12 years

f) Principles For Identifying Land Loss Related Entitlement

The following principles will be followed while arriving at the entitlements for three categories of PAPs mentioned below

Category 1 PAPs losing land which results in their balance land after LA being above MEL. Cash compensation will be provided at market value which allows the PAP to purchase land elsewhere or invest the compensation in fixed deposits to earn a regular income

Category 2 PAPs having land above MEL before LA but below MEL after LA. In such cases, additional land adjacent to the current land will be procured, if available, so as to leave him with a MEL after the project. The balance land (difference between his original land holding and MEL provided) will be compensated by cash. In case procurement of additional adjacent lands to bring the post LA land holding of the PAP up to MEL is not possible, the PAP will be provided alternate contiguous land equal to the MEL elsewhere. Under such circumstances, the entire land holding of the PAP will be acquired by the project. The PAP will also receive cash compensation for the balance lands as described above

Category 3 PAPs having land below MEL and part of it needs to be acquired. All his land will be procured and he will be provided contiguous land, equal to the MEL, elsewhere, i.e. land for land option will be the first priority. In addition rehabilitation measures will be identified and implemented to ensure that the post LA income level for such PAPs remain above a threshold income level necessary for sustenance. The minimum income level of Rs 22,400 equivalent to two times the poverty line (currently defined Rs 11200 per year at 1991 prices) is considered as the threshold level for VHRP

g) Institutional Arrangements

The two main issues focused are:

- Issues related to LA and alternate land allocation for severely

- Affected PAPs, and Issues related to Economic Rehabilitation (ER) of PAFs

Land acquisition (LA) is primarily the government responsibility and a mutually acceptable compensation at market rate is to be arrived at through negotiations. The SPV is committed to pay the difference between the compensation amount as per government rates and the negotiated settlement price of the land. The procedure therefore will involve interaction and consensus building with the PAFs on an agreeable fair rate of compensation. LA for the project is the responsibility of the Revenue Department, which is done through a Special Deputy Collector or District Land Acquisition Officer (*LAO*) at the district level. Thus, a district-wise Compensatory Land Procurement Committee for each of the two districts is proposed to facilitate identification, purchase and transfer/allocation of land to the severely affected PAPs.

Economic Rehabilitation (ER) Policy: This is one of the critical areas of project implementation. It is proposed to set up two committees:

- (i) *Project Level R&R Monitoring Committee* to ensure that the proposed ER measures are being implemented as planned, make policy decisions to facilitate implementation of the same and give necessary administrative decisions/directions as required, and
- (ii) *District Level R&R Implementing Committee* to implement the identified ER program.

In this context, it is necessary that a NGO experienced in LA procedures and in implementing income generation schemes work closely with SPV and government. Thus the implementation responsibility through an institutional arrangement will need to be developed around the SPV, GoG Representative and NGO involvement.

6.4 Measures Taken To Minimize Resettlement

In order to reduce the R&R issues. The design option included taking bypasses to out-skirt the villages with a new 4- lane carriageway. The Consultants have proposed following measures to minimize the resettlement and to avoid the loss of public utilities and cultural properties like temples, mosques, etc

- 1) Bypasses at Jarod, Asoj, Baska and near Halol, and
- 2) Restriction of carriageway at Khandewadi

Public Information and Consultation (PIC): The PIC study reveals that, Since the proposed project is linear in nature and very few structures come in the proposed ROW except for the villages Jarod, Asoj and Baska. Public Information and Consultation was conducted through participatory approach, which has led to introduce the following major modifications in the RAP:

- Free toll for project land owners (PAPs) whose land is acquired. This may be regulated by allowing only one commercial and one non-commercial vehicle per affected family;
- Private lands and houses which get isolated or cut off due to acquisition of land in the project, will be acquired if the owner gives his / her consent to such acquisition. This would, however, apply only to oustees who can no more make suitable economic use of their non-acquired assets,
- Provision of underpasses across the road in three project villages for safety of the villagers and animals crossing the road.
- The alignment of Asoj bypass was modified to minimize the impact due to land acquisition to the land owners, and
- Number of road crossings were added to meet the community needs at appropriate locations

6.5 Environment Management Plan (EMP)

As per detailed EIA report, the project will however have some negative environmental impacts on the ambient air quality and noise levels during the construction phases. Other issues such as green belt removal and land acquisition are also related to the project. Although some of these impacts, especially air and noise impacts cannot be fully avoided, measures can be taken towards reduction of these impacts by way of mitigatory measures. The project has overall positive impacts by way of reduction in travel time, congestion and accidents. Also, in terms of prominent environmental impacts of road projects on air quality and noise levels, the project brings considerable improvement to possible exposure levels to population when compared with no project scenario.

The probable impacts caused during Construction Phase and Operational Phase of the proposed project and the mitigatory measures to be undertaken by the concerned responsible entity have been briefly summarized in the study for each major environmental issue.

It is recommended in the report that the following back-up facilities be provided as a part of the project in the event of an accident due to continued and increased transportation of hazardous substances,

- i. Ambulance stationed at the toll booth
- ii. Tow truck for removing damaged vehicles
- iii. Communication facilities at each (and in between) ends
- iv. Access to fire-local (district) fighting facilities.

6.6 Our Post Evaluation Study

The aim of the study is to find out whether the R&R measures adopted in the project are appropriate and to find out the effectiveness of the measures taken and the level of satisfaction between PAP's have been studied.

Method Adopted – The method adopted for the post evaluation study is a field survey method with the interview from the three categories of the respondent on a prescribed format. The actors covered are

- a The Project authority
- b The Commuters
- c The Project Affected Persons (PAP's)

The summary of responses received are given in the annexure

In the study around 42 PAPs (Title and Non-Title Holder) are covered with 9 Project Authority people who are involved from the starting of the project, in addition to that the responses of around 45 commuters are also taken in the study

6.7 Findings of the Case Study

- The most of the PAP's are satisfied with the compensation amount they had got for their land, but few of them wanted land for land option, as they consider land as a non-consumable resource and respect land as mother
- Due to less no of openings and intersections, the service road users have to go round many time and to save this they are forced to drive in the wrong side of the road side which is creating problem and this results greater chances for accidents to the pedestrians and animals and inconvenience
- However, with the use of latest technology and efficient equipments the fully-grown trees are relocated near-by but their survival ratio is poor
- The watering to the planted trees are done through water tankers and the tankers takes water from a well located at Jarod and gives charge around Rs 25 per tank, so in that way the owner of the well is benefited
- Some PAP's had lost their land in both sides now they are facing difficulties as the remaining land area in the both side is not sufficient for

agriculture. In that case the remaining area also should be taken up by the project authority, as is it of no use for the owner concerned.

- The people wanted the welfare in terms of drinking water and water for agriculture use
- As three villages are bypassed the business are affected but the safety of the people and the quantum of R&R problem otherwise encountered is reduced
- The service roads, which are meant for local users specially, for bullock carts, two wheelers and bicycles, due to some political interference are now mostly used by the commercial vehicle (four wheelers mostly trucks and cars)
- The Most of the vehicles (around 40 to 50 %) are using service lanes, which is creating troubles for commercial utilisation of the toll road and the volume of traffic is too low from what is expected in the planning stage
- Regular Commuters (truck drivers) of long distances have stated that due to toll road some vehicles going from Surat to Delhi prefer other routes. However, the alternate route being longer involves more time and more fuel consumption.

6.8 Four Laning and Strengthening of NH-2 from Sikandra to Khaga

6.8.1 Background and Location of the Project

Under the Golden Quadrilateral Scheme of Prime Minister, the various National Highways connecting Delhi-Mumbai-Chennai-Kolkatta is under conversion from two-laning to four-laning and strengthening. In tune with such policy, the Nh-2 is under reconstruction under different phases. One of the phase starts from Km 393 (near Sikandra) to Km 115 (near Khaga). The work involves four laning and

strengthening of existing two lanes in this section of NH. It also comprises of conversion of the stretch of Sikandra – Bara which is an existing MDR. This section of the highway traverses mostly through plains and has mostly flat gradients.

The project is proposed to be divided into the following three sub-packages for international contract bidding taking into account homogeneity of traffic, length, the district boundaries and the likely cost of the sub package

- | | |
|-----------------|--|
| 1 Package II A | Near Sikandra to Panki / SAIL chauraha |
| 2 Package II B | Kanpur Bypass Panki/SAIL chauraha to Fatehpur Border |
| 3. Package II C | Fatehpur border to Khaga |

The location of the Packages is shown in Figure 6.3 since our study has covered package II-A, the detail of the same is presented below.

6.8.2 Detail of the Package II A with Progress:

The package covers the section of the Nh-2 that passes through via the towns of Rasdhan, Mungisapur, Akbarpur, Rania, Kanpur and it is funded by the World Bank. The extension of the project is done by the NHAI and the Contractor is Thailan-Somadatta Builders, India with M/s Italian Thai Development Company Limited (Joint Venture). The work of package II-A and II-C is under progress after completion of the same of the formalities. The EIA study of the packages have been completed and the same is under execution with the help of a NGO under the supervision and monitoring by World Bank.

Figure 6.3 Location of the Sikandra- Khaga Road Project

Figure :6 4 Sketch of the Sikandra-Khaga Road Project II -A

The Supervision Consultant of the project is M/s BCEOM-STUP-AARVEE

For the speedy progress of the work the Road section along-with all Bridge Sites have been handed over to the contractor, Clearing and grubbing and survey work is in progress with the work started at some places from Sikandara onwards. The employers site office and residential accommodation work is completed.

The project length of 61.602 km falls in District Kanpur Dehat. It passes through Akbarpur, the new district Headquarter and Industrial areas of Rania. The four laned road on the MDR which have been declared as NH-2 will be concrete road and the rest of the length the new road will be concrete and the overlay on existing road will be bituminous. Underpasses and service roads are being provided at urban locations with raising of main NH, thus segregating the slow and fast moving traffic. Right of Way clearance from human encroachments is being implemented in accordance with the World Bank Guidelines further, the R&R Policy is agreed between Govt. of UP and GOI.

The number of villages affected in the part II –A, section-1 are Sachedi, Kisannagar, Raipur, Rania, Baragaon, Barajod and Section-2 covers the villages Akbarpur, Kripalpur, Tiwaripur, Gauriyapur, Bihar Choki, Bihar Ghat, Section -3 Covers Mungisapur, Kandhi, Rasdhan, Sikandara. In order to examine the R&R efforts of the project authorities in a comparative framework of the R&R policies of the VHTR, we have undertaken few villages in the phase II-A of construction. The villages surveyed thereby are Sachedi, Kisannagar, Rania, Baragaon, Barajod, Rasdhan, Mungisapur, Bihar Choki, Bihar Ghat, Akbarpur, Kripalpur.

6.8.3 Traffic Scenario.

The results of the traffic surveys undertaken at different Intersections are summarized in the table below

Table 6.5 Difrent Types of the Vehicles in the Intersection (SKR Project)

Intersection	Year	Petrol Fuelled Vehicles			Diesel Fuelled Vehicles			
		Cars	Two Wheeler	Total	Three Wheeler	Bus	Truck	Total
Sikandra	1999	85	78	163	40	30	99	169
Barajod	1998	65	33	98	87	29	226	342
SAIL/ Panki Crossing	1998	171	86	257	230	32	214	476
Naubasta	1998	134	460	594	722	16	252	990
Ramadevi	1998	162	311	473	1065	90	382	1537
Chaudagara	1998	37	12	49	128	161	339	483

6.8.4 The “ NO ACTION ” Alternative

Through the present highway condition is fairly to be good. However, there are traffic congestions, accidents and wayside facilities are inadequate. The Kanpur bypass impedes the traffic considerably, due to many crossings on the highways causing severe bottlenecks.

It was recognized that any failure to initiate highway improvements will impede regional development and add to the obstacles, which the residents are currently facing to maintain economic stability and growth. The safety of the people using the highway was another consideration. Their quality of life is directly related to

their ability to transport process and to market agricultural crops, raw materials and processed goods from and into industrialized hub center of Kanpur which would decline if the ability of the existing highway to handle the ever-increasing traffic load decreases

Thus, it has been felt that the “ No Action “ Alternative is neither a reasonable alternative nor a prudent course of action In view of this justification, the “No-Action” alternative is not compared with the “with project” alternative in terms of traffic projections

6.8.5 Land-Use

Along side the project highway stretch, the ground survey reveals that the land-use is mixed type viz peri-urban, semi-urban and rural The green belts are found in semi-rural and rural areas. In certain stretches industries are located astride the highway. Barring the towns, villages and industrial areas, the adjoining the highway is generally irrigable The farmers mainly take up three crop in a year i.e one crop in each season of Rabi, Kharif, and Zaid.

6.8.6 Socio-economic status of the people.

In package II-A stretch it is observed that 81.19% persons of section I and 76.18% of the section II are engaged in small business activities around the corridor It was also observed in the study that in section I 14.14% of the persons are engaged in labour activities whereas it is about 2.36% in case of section II In terms of employed persons in the govt services and private services is already ahead of section I

In package II-A, the work force participation of persons is 22.13% in section I and 54.99% in section II

Taking in to account the findings of the socio-economic survey. It is revealed that more than 50% of the families of the entire stretch are economically well off. As a

matter of the fact the standard of living people in the project stretch is moderate, but still a considerable percentage, i.e 45% of the persons are below the poverty line. A person who has been designated falling under 'Below Poverty Line' category as identified by the state government and earning upto 15% above the critical poverty level & persons belonging to Scheduled caste, Scheduled tribe, disabled, handicapped, orphans, destitute person and women headed household. The total number of women-headed families is only 15.85% where women contribute financially to the family.

In package II-A, the family size is 7.25 person per family in section I and 5.98 per family in section II. Percentage of the persons below 18 year of age is 44.36 and 40.87% in sections I and II respectively.

Taking into account the family details, it has been found by the study that in package II-A most of the families are joint in nature. The percentage of the population that think that family structure will be disintegrated due to this project is 27.75% and those who do not favour this notion account for the rest 72.25%.

The details of the PAP's and the existing community facilities are indicated below in the table 6.6.

Table 6.6 The affected persons and Community facilities in the IIA of Sikandra- Khaga Project:

S.No		PERSONS AFFECTED			Total
		Package I	Package II	Package III	
1	Land Acquisition (Agriculture)	77	128	404	609
2	Business Squatters	11	4	35	50
3	Kiosks	199	98	290	587
4	Temples affected	3	2	6	11
5	No. of Hand pumps	90		0	90
6	Encroachments	0	0	53	53
7	Squatters (BPL) based on Ration Cards	1	2	3	6

6.8.7 Rehabilitation & Resettlement (R&R) Policy of the Project

The NHAI aims to resettle and rehabilitate the persons affected by its 4-laning project in a manner so that the PAP's do not suffer adversely. It shall endeavor to improve or at least retain their previous standard of living, earning capacity and production level.

Applicability:

The R&R policy is applicable to those who are living, cultivating and practicing any activity in the project impact area and area are affected adversely by the project activities as identified by the census.

6.8.8 Support Principles for Different Categories of Impacts in the SKR Project

The principles adhered in the R&R policy is discussed in this sub-section

1. The Title Holder belongs to two categories:

- a *Loss of Agricultural Land:* Compensation for the loss of land within the ambit of NH Act or LA act and assistance to meet the replacement value as per the R&R policy
- b *Loss of Structures:* The Pavements for the compensation for the structures will be based on Public Works Department basic schedule rates without deducting the depreciated value

2. Squatters and Vulnerable Encroachers :

The payment of compensation for the structure will be based on Public Works Department basic schedule rates without deducting the depreciated value.

3. Grants

Transitional Allowances are granted to eligible affected families of Titleholder, Squatter, and vulnerable encroachers. The grant is calculated as per the minimum wages over the period of nine months.

While Shifting Allowances is given as a lump sum amount to all families displaced, Economic Rehabilitation Grant (ERG) is granted equal to the income of the person who is below poverty line as calculated by the state for one year to the vulnerable and wage labourers.

The Rental Allowance is a fixed for some or all the displaced families for 9 months.

4. Provisions of Alternate Plots it envisages:

- i) *Agricultural land*: For the vulnerable families, if they lose land
- ii) *Plots for Houses*: The Vulnerable displaced families will receive 25 to 35 sqmts free of cost if they lose house
- iii) *Plots for shops*: the vulnerable families will receive 15 sqmts free of cost if they lose shop
- iv) *Resettlement site*: If more than 25 families are displaced from one settlement and opt for alternative resettlement sites it will be developed with adequate basic infrastructure and utilities. If they do not opt to settle at the resettlement site then the cost for the infrastructure development will be distributed equally among the families. The vulnerable family will receive residential/commercial plot free of cost and others on pavement basis
- v) *Joint ownership*: the alternate plots will be registered in the joint name of the entitled persons and her/his spouse

5. Other General Policy

This covers the following categories of RAPs

- *Kiosks* families to receive a flat sum for business disruption. Provision of vendor market if so desired by at least 50 vendors and will be provided with rent free for six months and thereafter encouraged to purchase
- *Loss of wage earning* A grant equal to 6 months lost income for wage labourers
- *Perennial and non perennial crop and fruit trees* The family will be given 4 months notice in advance and grant awarded for lost crop/produce of fruit trees at market value
- *Host communities* Resources will be enhanced if residential people exceed 200 or 10% of the population
- *Tenants:* in any amount deposited as advance pavement to the landlord or any additions made to the existing structure will be deducted from the compensation paid to the landlord
- *Salvage material* All families will be allowed to take material free of cost from the demolished structure
- *Training.* All affected peoples will be eligible for the gradation of skills for improving their livelihood
- *Government schemes* All privileges enjoyed by the SC/ST beneficiaries under various development and poverty alleviation scheme will be executed to the displaced SC and ST population too. And other development schemes of the government too will be extended to the beneficiaries.

6. Conservation and protection of Community Assets :

- Easily replaced cultural properties will be conserved in consultation with the community
- Loss of firewood etc will be compensated by involving the communities in the social forestry scheme
- Adequate safety measures, landscaping of community common area, improved drainage etc are all provided in the design of highways

7. Institutional Arrangement:

The following institutional arrangements are envisaged to monitor the R&R Policy

- a) *District Level Communities*: to assist in deciding the replacement values and facilitating the implementation of resettlement and rehabilitation plans
- b) *Package- wise plan*: There is a R&R manager for each contract and there are NGOs to implement the project
- c) *Grievance Residential Cell*: Grievance Residential communities is informed at each District Head Quarter The PAPs will have access to the communities to express their dissatisfaction over the process of implementation of R&R All the issues will be resolved in the monthly meetings.

The main features of the issues involved as well as the R&R actions of the SKR project are shown in the table 6 7

Table 6.7 The Main R& R Issues Identified in the SKR Project

S. NO	Issues	Proposed Action
1	Tractability of The Structures	All structures within the specified corridor were inventoried. A unique identification number is allotted to specifying the change, village, legal status, and the usage of the structure.
2	Boundary of Acquisition	The Pillars demarcating the boundaries of the acquisition will have to be marked.
3	Availability of Site for Relocation	Contrary to the policy/plan suggestions it was found that Gram Sabha land is normally not available. Further, if Gram Sabha land is available, found to be illegally occupied in most of the cases. In such cases the solution will be to motivate the community to donate their land for the site.
4	Rehabilitation Process of The Religious Structure	The rehabilitation of religious structures (Praan Pratistha) requires funds. In such cases, the community is to be mobilized and the funds collected for the rituals to be performed. However the best option is that for the PIU to create allocations under a fixed head in this regard.
5	Site for Vendor Market	Mostly, Gram Sabha land is not available at places with kiosks concentration. In such cases, alternative sites will be proposed, in the nearby villages and the people are motivated to move there. The prospecting of the site is again a tedious process because it requires co-ordination with the number of agencies e.g. Lekpal (Revenue Official), Pradhan, among others.
6	Absentee Landlords (Titleholders)	In most of the road projects it is found that some of the title holder is not traceable. In such cases the Gram Pradhan of the respective village will be first contacted to find about the whereabouts of the person. Even after this if the person not found, then the person is intimated through the latter at the address mentioned in the Revenue Records. Such persons are not eligible for any

		Rehabilitation measure as that is assumed he/she is single person living outside, only the compensation for the land and the structure loss will be paid to them.
7	Safety of the Local Populace and their way towards farms	At places the safety of the local populace is considered for crossing the road and problem of severance. For that sufficient number of Underpasses will be provided.

6.8.8 Our field Survey and the Coverage

With a view to assess the efficiency of the R&R policies of the SKR project, I have undertaken the field study during February- March-20002 with the help of NHA₁ and the NGO executing the EIA findings. Our study has covered a number of PAPs of different villages which are provided with their response in the Annexure E.

6.8.9 Results of the Survey:

- 1) While some PAPs are benefited and some other are worse off which is not in tune with the R&R policy. As the main objective of the R&R policy is to restore the livelihood of the affected persons, this is felt that in the process, the Kiosks are mainly affected adversely as the owners lose their source of income. On the other hand the tSquatters are beneficiaries, who are not actually much different from owner of Kiosks but are entitled to avail RAPs.
- 2) In our country as we do not have a National R&R policy, it is observed that the entitlement package usually varies as the PIU is the main body who is responsible for finalising the entitlement. Due to such policies sometime people get benefited in one stretch and other loose in the other stretch.
- 3) It is observed by our survey that the R&R policy for project is not well defined. As it is not comprehensive one can use any clause in any manner as he wants to twist the policy.

- 4) In the future, if some road project will be there which would be funded by the Government and constructed by the PWD definitely the R&R measures of today will not be feasible do adopted later It will create a social imbalance in future
- 5) The limit of number of Vendors for the provision of vendor market does not seem to be practical as the present limit is at least 50, it is reported that if it is relaxed up-to 20, then only kiosks will get any real rehabilitation otherwise they are forced again to be on the road side
- 6) Through in the policy it is stated that all affected persons will be eligible for up-gradation of their skills through training, it is not clear if the kiosk will get any advantage
- 7) In this project, however, the relocation of the cultural properties is carried out in consultation with the community but it is felt that the quality of the relocated structures are not good enough if the project provides a better replacement for the same, they will get a good support from the communities in the progress of the project.
- 8) The grant for the ERG and training is not sufficient as stated by the working NGO They feel that it is not adequate to give certain good alternative skill training for the PAP's
- 9) The kiosks are not eligible for any other allowances except the shifting allowances which is fixed as Rs 500
- 10) The compensation provided for loss of agricultural land irrigated land elsewhere or orchard tree should be compensated suitably Income from lost fruit trees for a period of 7-8 years till the newly planted trees bear fruit.

- 11) Most of the time the R&R becomes a liability not a duty
- 12) In this project the NHAI is the central body that hired the NGO and also monitoring consultant. The NHAI pays to the NGO's are not free to work as they want most of the time. So it is suggested that an apex body should be there to assist and control the NGOs and monitoring consultant.

With these general observations we have undertaken a comparison of the R&R policies of both our case studies.

6.9 A Comparative Analysis of the R&R Efforts of Our Case Studies:

With a view to suggest some policy changes into the R&R policies of the road sector projects, a comparative analysis of the both case studies undertaken by us. The findings of such analysis are as follows.

- 1) As far as the tree plantation is concerned, the VHTR is much ahead of SKR project because the responsibility is assigned to the operating company. However, the same may not be feasible in the case of the SKR (Sikandra-Khaga Road) project because in case of the government projects no care taken for plantations after two- three years. At present, in the VHTR project authorities are spending up-to 30 % of the earning from toll on maintenance of the road and enhancement of the environment.
- 2) In the VHTR project, the service lanes are provided for the local population, so the chances for the accidents for villagers and slow moving vehicles are much reduced but in the SKR project no such service lane is there so the chances of the road accidents have increased. In the VHTR project the responsibility for the maintenance of the service lane is also with the operation and maintenance company. Thereby the local peoples are also enjoying the

good facility without paying the toll which is a major advantage of the VHTR project

- 3) Since the VHTR project is privatized, they are in apposition to afforded a better R&R options as their priority, to complete the project as early as possible. Further, due to privatization not much bureaucratic hurdles is there for the compensation finalisation under the prescribed policy
- 4) A colony with all amenities for the residential squatter in the Khandivada village in VHTR project is an example of their concerns about the PAP's and the R&R measures
- 5) The concerns of the various actors involved in the VHTRL project can not be questioned which is derived from the fact that every existing trees that stood on the road is replanted. In addition to that about 20 times the number of trees cut had been planted and the plant varieties selected according to the terrain and topography. But in the SKR project only two trees for every cut of the tree is planned
- 6) As the continuous profit is the main objective of the VHTR project for that they are keeping the road in good condition with timely maintenance activities which may not be possible in the case of the SKR project. From the past experiences of the government owned roads, the poor maintenance caused deterioration to the road surface and the riding qualities
- 7) In the VHTR project, three villages are bypassed with the consideration that more people would be affected if the road passes through these villages and also the safety of the villagers are taken into consideration.
- 8) In the case of the VHTR project, a crane, an ambulance and a doctor are available for 24 hours for emergency services, so as to act at the time of any

mishap or accident on the road and the road is cleared as early as possible using crane to ensure uninterrupted traffic flow. That may not be possible in any non-privatized project like SKR project.

- 9) Many local peoples have got employment in the VHTR project. At present out of the 230 employees, around 132 employees are from the surrounding villages who are engaged in for toll collection and day to day maintenance activities. The VHTR project is giving positive contribution in terms of social welfare of the people and the project is likely to last for 30 years. So one can find the contributions of the project in long term. However, in case of the SKR project during construction itself not much employment is there for the local people. Marginal employment opportunities may be created during the O&M of the project.

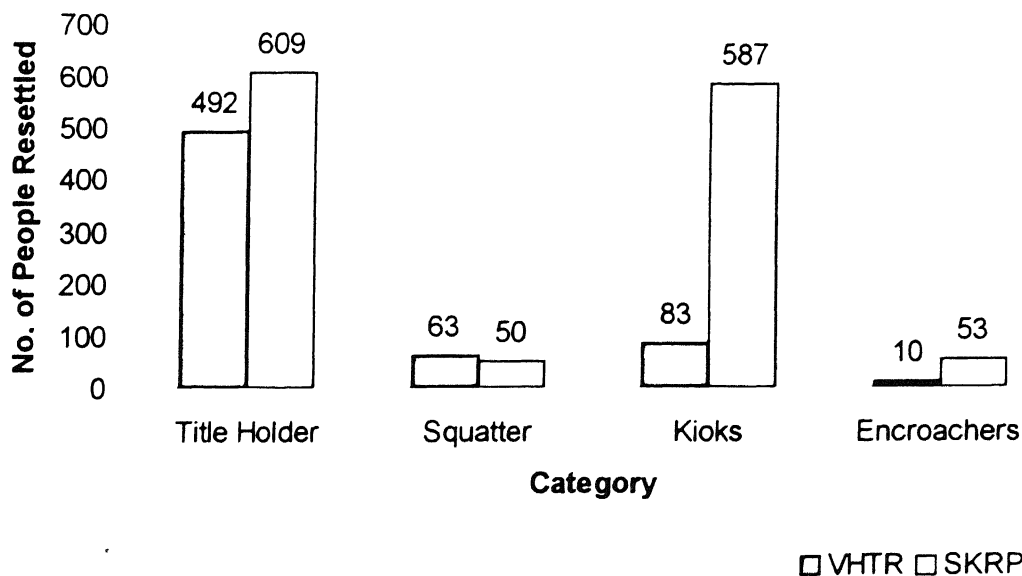
10) Categories of the PAP's in both the projects

11) Availability of the funds for long-term Environmental Management Plan

Any major transport sector project like highway project needs large inputs of resources and there is a different need to allocate capital investment towards the implementation of the short-term and long-term Environmental Management Plan. The effective implementation of such plans depends on the availability of the capital and the continuous source of funds to implement day to day environmental management activities, such as plantation, dust control, environmental monitoring activities etc. Hence, the end users should be able to absorb the additional cost this is truly reflected in terms of the toll-tax levied on the commuters. By taking into account the ply of the different type of vehicles in both the projects as well as the toll charges (given in figure 6.5) it has been noted that the total revenue collected per km per day in the VHTR project would be much higher than the SKR project so a part of the revenue generated can be invested in the Environmental Management plan which cannot be feasible in the case of SKR project. In both of the cases, as the recovery of the investment is also required after spending money on toll collection staff, maintenance etc, the VHTR

project definitely will save some money to spend on day to day and long term environmental management plan

Figure 6.4 The Various Category of the PAP's in both Project Compared



p

The in SKR project the data is only for package II-A

12) The categories of the PAP's in both project

Comparison between the two projects regarding the categories of the PAP's (Provided in figure 6 4) indicates that the kiosks in the case of the SKR Project is much higher than that of the VHTR project this indicates that the economic condition among the PAP's in the VHTR project is better then the SKR project While the number of the Title-Holders in the case of the VHTR are 492, as same has been estimated to be 609 for SKR project

Figure 6.5 The comparison of the Toll Charges Between Two Projects

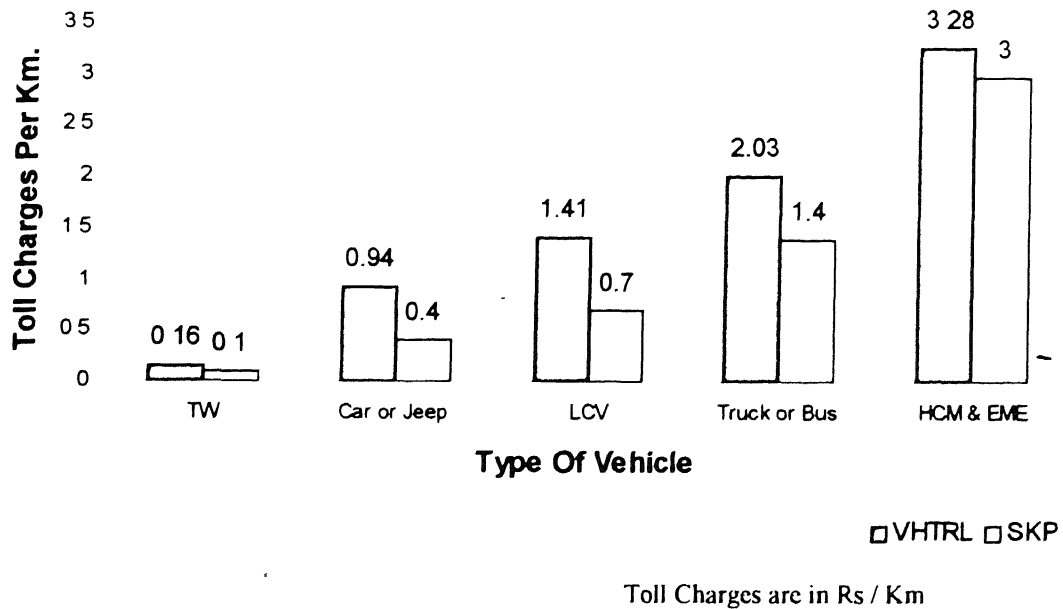
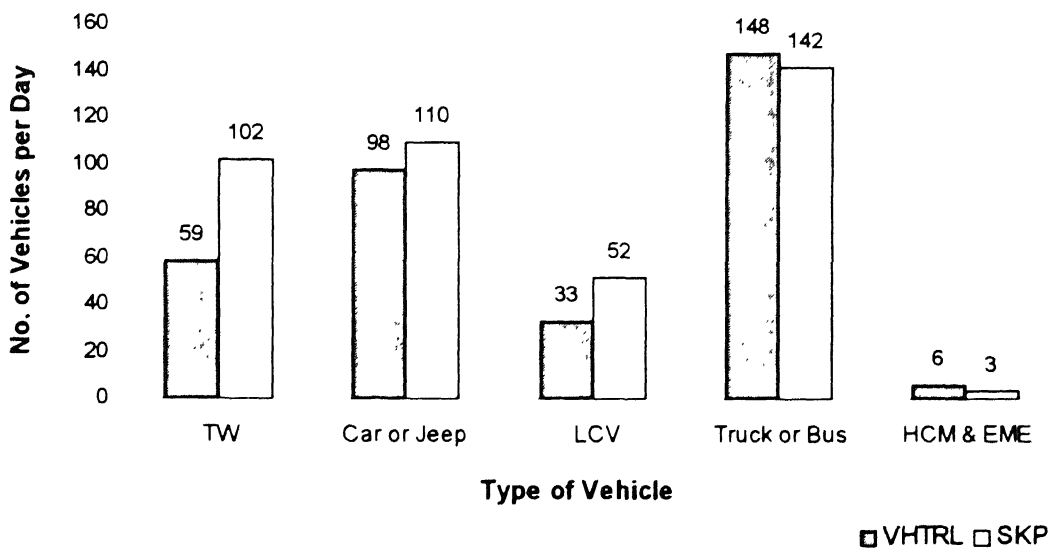


Figure 6.6 Different Types of Vehicles Per Day



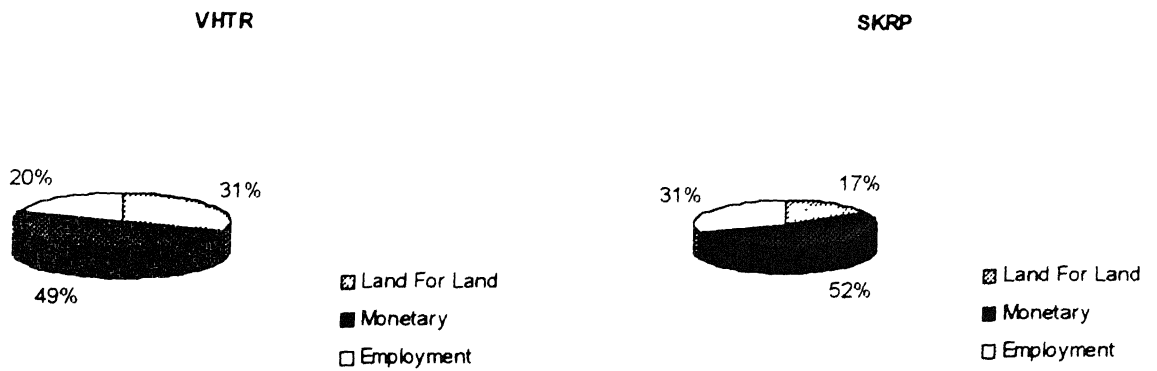
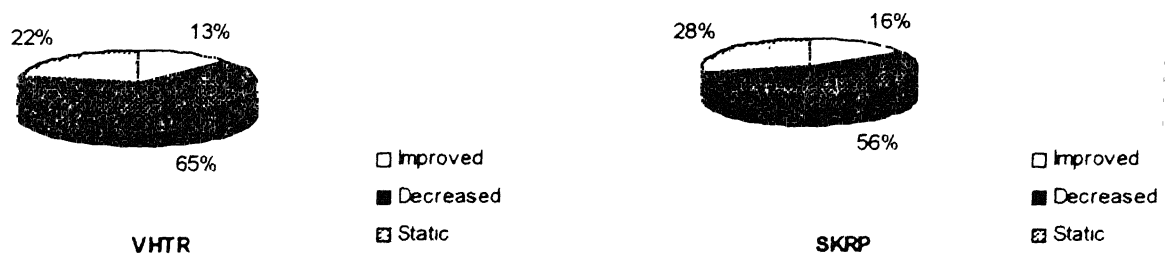
13) Alternate Option for Resettlement

Through the survey exercise, it has been estimated that the alternate options for the resettlement among the PAP's has been land for land, monetary compensation and employment (as shown in the figure 6.7). However a comparison shows that most of them preferred monetary options for their rehabilitation (i.e. 49% in the VHTR project and 52% in SKRP) a good number is opted for the land for land option. Quite a few have opted for employment. It is also observed that PAP's who lost land small patches have preferred compensation in monetary terms rather than land for land option. The employment option is rather relatively higher in the SKR project PAP's are more inclined for that option as compared to the VHTR project option may be due to the fact that Gujarat most of the persons opt business as compared to the job as long-term option.

14) Opinion about the position in the Society after land acquisition:

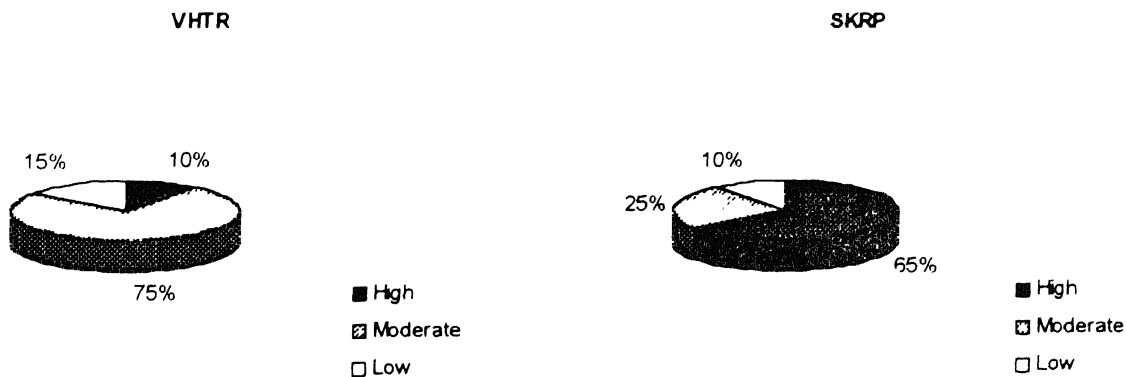
the position in the society after land acquisition is indicated in the figure 6.8

It shows that in both of the cases, the response is that their position after the land acquisition has been decreased as they consider that land is a status of prosperity. As the compensation finalisation is under progress in case of the SKR project, the particular response that status has increased or decreased is not being assessed. With regards to the utilisation of the compensation amount, in the VHTR site the PAP's have used the money either for purchase of land or to buy agricultural equipment or to invest that money in some business.

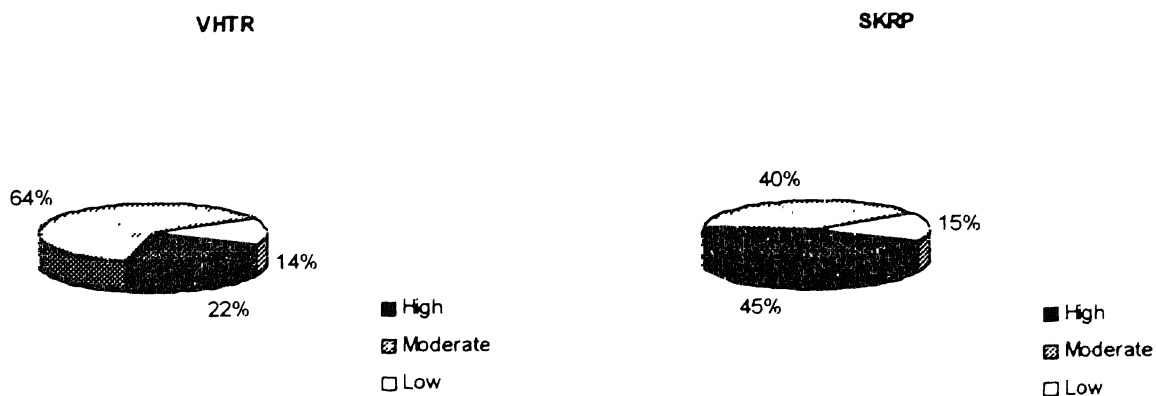
Figure 6.7 Preferred Option for the Resettlement**Figure 6.8 Position of Society after Land Acquisition**

An opinion survey was undertaken by us regarding the toll charges from the Middle Income as well as the Higher Income groups. The responses of the users are indicated in the figure 6.9 and 6.10 which shows that the middle income group the existing and the proposed toll charges are very high. On the other hand the higher income group puts it as moderate rate. But the intra project comparison shows that the higher income group users of the VHTR project are willing to pay for the good services, hence, willing to pay to higher toll as compared to that in the SKR project.

In the case of the VHTR project, 75% of the respondents accept the toll charges as moderate and they are willing to pay the same. Through in the SKR project the toll charges are much less as compared to the VHTR, still the responses about the toll is that it is high.

Figure 6.9: Opinion About the Toll Charges (Middle Income Group)

As per census taken from Middle Income Group (who have two wheelers)

Figure 6.10 Opinion About the Toll Charges (Higher Income Group)

As per census taken from High Income Group (who have four wheelers)

Chapter 7: CONCLUSION AND POLICY IMPLICATION

7.1 General Observations:

Infrastructure is the lifeline of any nation, in view of the fact that the availability of adequate infrastructure facilities is critical to stimulate economic growth to improve competitiveness and also internationalize of the economy. Above all, helps to reduce poverty through its multiplier linkages. In other words, adequacy of infrastructure determines a country's success and another's failure – in diversifying production, expanding trade, coping with population growth, reducing poverty or improving socio-economic environmental conditions.

Rapid growth of population, coupled with industrial growth and urbanization have brought a significant development in our traffic flows. As a consequence, the pressure on our road network has increased many fold. On the other hand, owing to constraints of funds with the government, the severe shortfalls. Therefore, the provision of sufficient and quality road infrastructure in our country has been focused in our five-year plans. In the 1990s, it was realised that privatization is the best alternative to bridge the gap between demand and supply. Further, it offers advantages such as cost efficiency, innovative technology and speedier construction.

We have noted that in course of our field investigations, the various measures that can be adopted for inviting private participation in road projects are:

- Reliable and independent demand estimates for infrastructure created are absolutely necessary for the success of privatized infrastructure projects.
- Identification and allocation of risks are very important in the development of privatized infrastructure projects. The risk should be

allotted optimally in such a way that are borne by the party which must be competent to bear the particular risks. At the same time policy maker should find effective solutions to overcome the risks.

- Considering the urgent need of infrastructure projects and the risk involved in the same, physical concessions and the tax incentives should be offered to the investors. It is particularly necessary from the point of view of reducing the cost of the project.
- Government should provide the timely environmental clearances from the proper authority for infrastructure projects as well as for Real State Development site.
- Government should evolve a single window clearance system for obtaining all the clearances from various Government Departments & such clearances should be reduced to the minimum.
- Government should provide the guarantee for the minimum expected returns from the traffic.

High initial cost and long breakeven period act as a deterrent to the private sector to invest money in the infrastructure projects. Considering the peculiarities of returns, privatized infrastructure projects should be so structured and executed that returns on the investment made on these projects should be as attractive as in any other industry in order to establish the viability of the road sector projects. In the EIA studies should be undertaken by the authorities in tune with the national policies.

In EIA studies undertaken by us with respect to Vadodara-Halol Toll Road project and Sikandra-Khaga Four Lanning section of NH-2 have established that the R&R measures adopted in the VHTR project are much better and enduring than the SKR project. The relative superiority is attributed to privatization of the project. Through privatization of the road infrastructure the additional

- The process of implementation and monitoring of rehabilitation activities associated with various road projects is rather weak and needs some consideration
- Safety of the road users and the roadside communities had been found to be a major concern in the road projects
- Underpasses should be provided to facilitate the people living on either side of the road and also to have access to facilities. This will avoid disruption of social relations and thus network

Our study has reinforced that potential of environmental assessment as a sustainability instrument. But the criteria against which development proposals are traditionally judged are not leading to sustainable development. Thus there should be an increased stress on the development and incorporation of objective and quantitative techniques in EIA, which would contribute to the decision-making process.

The proposed modified EIA methodology can be applied in evaluation of the project impacts to select specific alternatives and in the planning process to minimize the potential adverse impacts in future projects. It will be easier for the project evaluator or decision-maker to compare between the various alternatives available.

The systems of parameters, few impact quantification tables, and an alternatives criteria suggested in the proposed methodology are only a starting point in environmental evaluation. They must be improved as the system is used. The suggested representative methodology can work as a standard for the quantification of the impact so that the uniformity can be ensured between different EIA studies.

Lastly, any project must be based on the rational choice of the people especially those who might be adversely affected by it. Only such an approach ensures both that displacement is minimized and the project really serves the public purpose. Peoples

participation in formulating and selection of a R&R activities ensures that those who are going to be PAP's are not made victims but rather partners in the development

7.3 Limitation of the Study and the Scope for the Future Work

As the privatization of the road infrastructure are in their infancy stage it is difficult to state about their success in India. One can find out the trends after studying some more road projects, which are privatized recently in India. As regards the future works one can find out, privatization of road projects anyhow contribute to reduction in harmful environmental effects or in preservation of the environment?

The systems of parameters, few impact quantification tables, and importance criteria used in the proposed methodology are only a starting point in environmental evaluation. They must be improved as the system is used. The effectiveness of the proposed method need a testing. The standard impact quantification tables should be made with the help of group of experts drawn from different fields. As 40 environmental parameters are identified in the study, it is difficult to quantify them and assign importance to each of them in available expertise, time and manpower. One can focus on that part and this can be taken up as future research work by using Dalphi Technique after which the quantification table can be standardized easily.

The present study covers two projects are studied and compares various aspects of the R&R in the road projects. In the view of the fact that privatized projects are offering better R&R practices as compared to Government project, it is really too early to say something and conclude. As more privatized projects are coming up one can study those aspects in depth but any investigative research will involve a lot of time, availability of the data in detail and manpower for consideration of the various issues involved in it, which should be provided in the project proposals.

Annexure A: Description of the Impact by Various Activities during Construction and Operation on Environmental Parameters.

A) Impacts During Construction

I) Air Quality The impact on air quality during the construction phase are however temporary but significant

- Ambient concentration of SPM could increase due to dust from excavation and grading
- Emission from the use of heavy trucks & construction equipments (generators & compressors)
- Odour bearing air contaminants from certain phase of construction such as during paving operations
- Construction equipment and material hauling could affect traffic flow. If construction delay traffic enough to significantly reduce travel speeds, general traffic related emission could increase

II) Noise: The construction related activities, which have impact on air quality also, have impacts on noise environment. The major source of noise pollution are the vehicular movements and activities in the construction yard i.e. concrete mixing, casting, material movement and also from the DG set and compressors

- During construction there would be temporary increase in sound levels along the project corridor due to the use of heavy equipment and hauling of construction material
- In our country no national standards are available for highway equipment, for World Bank projects construction equipment of International standard has been used

Typical Noise Levels Associated With Highway Construction

Activity	Noise Levels in dB(A)
Grading and clearing	84
Excavation	89
Erection	79
Foundation	88
Finishing	84

III) Water Quality:

- Loss of hand pumps, well and ponds due to construction activity
- Construction equipments generates large amount of waste oil and its proper handling is critical, as haphazard storage and leakages can result in contamination of groundwater aquifers
- Erosion usually thought of as occurring during rain event can be from either rain or wind. It is the erosion during storm event that significantly increases sediment & associated pollutant loading to both onsite and offsite surface waters. It is partly because deterioration occurs to offsite water bodies that make it important to manage erosion at source
- Excavation that cuts into an aquifer, for example, can cause the water table to drop, disturbing the supply of water to nearby wells and modify water availability to vegetation
- Roads as linear engineering feature can modify water flow and drainage patterns over wide areas, causing rising water levels, excessive drying, erosion and vegetation die-off
- Construction camps, with poor drainage and wastewater facilities will contribute to the deterioration in the water quality
- The project will rehabilitate bridges and culverts throughout which will cause alteration in the overall drainage pattern
- Village ponds

IV) Soil/Land Environment:

- The activities during the construction phase for the road projects involves site clearing, cut and fill operations, disposal of construction debris. During these operations the nutrient status of the topsoil will be affected and also physical properties like bulk density, infiltration rate/permeability, porosity, water holding capacity etc. Soil erosion problems are likely to occur due to inadequate culvert capacity, protection of cut and fill areas and fill areas and poor drainage.
- Construction machinery moving around the right of way can create soil compaction, which may harm the soil's future potential as farmland, impair drainage and increase the risk of flooding.

V) Material Resources

- Soil erosion cause downstream water quality reduction.
- Loss of topsoil and vegetation cover may cause habitat degradation and species loss.
- Instability of the quarry material.
- Significant environmental problems can develop if borrow sites are not rehabilitated. Impacts range from chronic erosion and siltation to air quality and noise impacts during their use, as well as permanent and aesthetic intrusion if rehabilitation is neglected.
- Temporary bitumen production plant or concrete batch plant cause serious air, noise, and water pollution if effective preventive measures are not taken.

VII) Socio Economic Environment:

The possible impacts likely to arise are due to

- Land acquisition
- Loss of employment
- Social disintegration,
- Demonstration affects
- Loss of flora and fauna
- Additional pressure on existing infrastructure facilities due to migrant construction labours.

VIII) Flora:

- Loss of trees within ROW
- Loss of green tunnels
- Loss of canopies
- Compaction of vegetation
- Pollution and dust accumulation on vegetation

IX) Fauna:

- Effect on wildlife sanctuary, i.e interruption of migration routes of wildlife
- Endangered species
- Illegal hunting by the construction workers
- Transmission of communicable disease
- Obstruction to local communication i.e obstruction of routes between farms and houses
- Social and cultural disruption

X) Aesthetics:

- Disfiguring landscape by high embankments & deep cuts

XI) Archaeological Property:

- Interruption to assess to cultural property due to construction activity

- Contamination of the site due to improper disposal of waste, fuel and lubricants
- Damage to structure due to vibration & air pollution due to operation of heavy vehicles and equipments

XII) Other Impacts:

- Destruction of utility lines
- Accidental risk during construction
- Poor quality cut and fill operations cause landslides, water blockages, habitat loss, species degradation
- Faulty construction material handling like bitumen, aggregate and concrete cause degraded air quality, increased noise and increased odors
- Work camp operations which results liquid and solid waste reduce water quality and may increase in bacterial diseases
- Land acquisition and resettlement effects loss of business, property, residence and reduce community cohesions
- Community disruption including indigenous people loss the sense of community and community cohesions

B) Impacts During Operation Phase

I) Air Quality:

- Dust & pollution are the main potential impacts during road operation

II) Noise

- The sound levels might be high in certain residential/ sensitive areas through which heavy vehicular traffic movements may take place

III) Water Quality:

- Contamination by fluid and lubricants due to road side litters
- Storm water runoff & groundwater recharge
- Accidental spills

IV) Land Environment:

The possible impacts envisaged are alteration in top soil quality due to deposition of dust and vehicular emissions containing lead (Pb) and surface runoff containing spilled materials if discharge on land

V) Socio Economic Environment:

Beneficial impacts are envisaged during the operation phase of the project i.e. relieve of traffic congestion, reduced travel time, fuel saving, improved accessibility, leading to development of real estate, industrial growth centers, new businesses, hotels and enhancement in local economy. The developments are likely to create secondary impacts contributing to increase in pollution load in the area.

VI) Flora and Fauna:

- When a road intersects with the wildlife corridors, the result is either cessation of use of the corridor because animals are reluctant to cross the road and an increase in mortality because of collisions with vehicle, or a delay in migration, which may result in weakening or disappearance of the entire population.
- Runoff containing spilled materials could have effects on fisheries in the surface water sources.
- Higher concentrations of the pollutants will have effects on photosynthetic activity of trees and plants.

VII) Archaeological Property:

- Increased visitors due to improved access could impact cultural property due to abuse and over-use.
- Increased noise, vibration and air pollution from increased road traffic can damage cultural property.

Areas of the cultural significance located near the project highway stretch have the potential of becoming a point of interest, thus require improved access and parking facility

VIII) Other Impacts:

- Induced roadside development of commercial, industrial, & residential infrastructure
- Impoverishment of non-motorized transport due to increase availability of motorized transport. Additionally the widened or new road can increase travel time and distance for short local trips, especially affecting access by foot, bicycle, and other non-motorized transport
- Development of squatters settlement on slope of embankment and on vacant parts of acquired ROW

Annexure B: Few Quantification Tables for Environmental parameters to find out of the ESV (Environmental Sensitivity Index) as suggested in Chapter 4

1 Loss of Agriculture Land

% of Agriculture Land Acquired	ESV
>25%	5
20-25%	-4
15-20%	-3
10-15%	-2
5-10%	-1
< 5%	0

2.Travel Speed

% Increase	ESV
upto 10%increase	1
10-15%	2
15-25%	3
25-40%	4
>40%	5

3.Per Capita Income

Increase %	ESV
1-5% Increase	1
5-15%	2
15-25%	3
25-35%	4
>35%	5

4. Relocation and Resettlement

No. of Persons Affected Directly	ESV
	-5
	-4
	-3
	-2
	-1

5.Travel Safety

Vehicle/Casualty Ratio	ESV
	-5
	-4
	-3
	-2
	-1
	0
	1
	2
	3
	4
	5

6. Noise

% Change in Area Exceeding Limit	ESV
>40%	-5
30-40% Exceed	-4
20-30% Exceed	-3
10-20% Exceed	-2
10% Exceed	-1
No Change	0
Up-to 10 % Reduced	1
10-20% Reduced	2
20-30 % Reduced	3
30-40 % Reduced	4
>40%	5

7. Siltation

% Increase in Siltation Conc.	ESV
>40%	-5
30-40 %	-4
20-30%	-3
10-20%	-2
<10%	-1
0	0

9. Soil Erosion

Increase in soil Erosion	ESV
50-200 M ³ / Ha/year	-5
15-50 M ³ / Ha/year	-4
5-15 M ³ / Ha/year	-3
0.5-5 M ³ / Ha/year	-2
<0.5 M ³ Ha/year	-1
0.0 M ³ / Ha/year	0

11. Surface Water Quality

[illegible]

12. Topography

% Highway Length Exceeding	ESV
Slope of 5%	
>5%	-5
0-5%	-1
0%	0

8. Air

SPM	HC+NO3	CO	ESV
			-5
			-4
			-3
			-2
			-1
			1
			2
			3
			4
			5

10. Soil Contamination

Increase in Metal Content	ESV
	-1
	-2
	-3
	-4
	-5

13. Social and Cultural Values

[illegible]

14. Travel Comfort and Convenience

	ESV
	0
	1
	2
	3
	4
	5

15. Social Interest (-5 to +5)

	1 Education	2. Health	3 Others

16. Ground Water Quality

	ESV
	0
	-1
	-2
	-3
	-4
	-5

18. Employment Opportunity

	ESV
	0
	1
	2
	3
	4
	5

19. Physical Infrastructure (-5 to +5)

	1. Water	Electricity	Others

20. Social and Cultural Values

	ESV
	-5
	-4
	-3
	-2
	-1
	0

Appendix C: Notification on Environmental Impact Assessment

With the Recent liberalization of industrial policy and series of economic reforms initiated during the recent years, it has become desirable to bring the major development projects within the preview of environmental impact assessment with a view to have sustainable development. In view of this a notification on environmental impact assessment of development projects was issued by the Ministry of Environment and Forest of India on 27 January, 1994 which was subsequently amended on 4th of May 1994 to make it effective. Some of the silent features of the amendment notification as follows

- (i) Mainly large projects involving hazardous operations or processes which are having significant pollution potential are covered in this notification
- (ii) Projects earmarked for small scale sector having an investment below 1 crore have been kept out of the preview of the notification
- (iii) Site clearance will be considered for the site specific projects such as , mining, pit-head thermal power stations, hydro-electric and river valley projects including flood control, port and harbours (excluding minor ports) and exploration of major minerals in area above 500 Ha
- (iv) Time frames not exceeding 90 days has been prescribed for environmental appraisal of the projects
- (v) The committee of experts will examine the project referred to the Ministry of Environment and Forests
- (vi) Public hearing system has been included for the controversial projects or those likely to have significant environmental ramifications

The following projects will come under the preview of the said notification

- 1) Nuclear Power and related projects such as Heavy Water Plants, nuclear fuel complex, Rare Earths
- 2) River Valley projects including hydel power, major Irrigation and their combination including flood control
- 3) Ports, Harbours, Airports (except minor ports and harbours)
- 4) Petroleum Refineries including crude and product pipelines
- 5) Chemical Fertilizers (Nitrogenous and Phosphatic other than single super-phosphate)
- 6) Pesticides (Technical)
- 7) Petrochemical complexes (Both Olefinic and Aromatic) and Petrochemical intermediates such as DMT, Caprolactam, LAB etc and production of basic plastics such as LLDPE, HDPE, PP, PVC

- 8) Bulk drugs and pharmaceuticals.
- 9) Exploration for oil and gas and their production, transportation and storage
- 10) Synthetic Rubber
- 11) Asbestos and Asbestos products
- 12) Hydrocyanic acid and its derivatives
- 13) (a) Primary metallurgical industries (such as production of Iron and Steel, Aluminium, Copper, Zinc, Lead and Ferro Alloys)
- (b) Electric arc furnaces (Mini Steel Plants)
- 14) Chlor alkali industry
- 15) Integrated paint complex including manufacture of resins and basic raw materials required in the manufacture of paints
- 16) Viscose Staple fibre and filament yarn
- 17) Storage batteries integrated with manufacture of oxides of lead and lead antimony alloys
- 18) All tourism projects between 200m—500 meters of High Water Line and at locations with an elevation of more than 1000 meters with investment of more than Rs 5 crores
- 19) Thermal Power Plants
- 20) Mining projects (major minerals) with leases more than 5 hectares
- 21) Highway Projects **except projects relating to improvement work including widening and strengthening of roads with marginal land acquisition along the existing alignments provided it does not pass through ecologically sensitive areas such as National Parks, Sanctuaries, Tiger Reserves, Reserve Forests**
- 22) Tarred Roads in the Himalayas and or Forest areas
- 23) Distilleries
- 24) Raw Skins and Hides
- 25) Pulp, paper and newsprint
- 26) Dyes
- 27) Cement
- 28) Foundries (individual)
- 29) Electroplating

Further some clarifications regarding the notifications are as follows

- i) A project proponent is required to seek environmental clearance for proposed expansion/modernisation activity if the resultant pollution load (air, water and solid) is to exceed the present levels. If it is certified by the concerned State Pollution Control Boards that no increase likely to occur in the existing pollution load due to the proposed

expansion or modernisation. The project proponent will not be required to seek environmental clearance from the ministry of the environment and Forest, but a copy of such certificate issued by the pollution control board will have to be submitted for the information. In the public interest, the impact assessment agency (IAA) reserve the right to review such cases.

- ii) Public hearing should be called for the projects involving large displacement of population or having severe environment ramification
- iii) Application seeking the environmental clearance should include the following
 - a. Filled in questionnaire as prescribed by IAA from time to time (20 copies)
 - b. EIA/EMP report (20 copies)
 - c. Risk analysis Report (20 copies)
 - d. NOC from the concerned State Pollution Control Board
 - e. Linkage for water and power
 - f. Summary of project report (one copy)
 - g. Rehabilitation Plan

Requirement of EIA and Risk Analysis reports can be dispensed with by the IAA. In case the projects which are unlikely to cause significant environmental impacts.

The project proponent will not be required to seek environmental clearance from the IAA, if required land for the project had been acquired and all necessary approvals from the State Government including NOC from the State Pollution Control Boards have been obtained before 27 January, 1994.

Industries with investments less than Rs. 1 Crore which are reserved for small scale sectors have been kept out of the purview of the notification.

Mainly the projects with a pollution potential having investment of Rs. 50 Crores and above will be required to take clearance.

Appendix E: The Summary of the Responses Taken by the PAP's in VHTR Project

S. No	Name of the PAP	F.S.	E.M.	Cat	L.L.	LALA	% Los	Agri.I.	Other I.	Loss Type	Comp	S.W.C.	Option for Restttement	Position After LA
					Ha.	Ha.		Rs	Rs	Land Tree	Bus	total	L for L Em Mon	Imp De Stat
Place:-Kotambi														
1	Gajraben K Varsava	10	1	TH	0.1	8.2	12.16	1800	8400	YES	NO	30200	YES	X
2	Vitthalbhai S. Vasava	9	2	TH	0.4	5.1	7.255	21000	24000	YES	NO	93150	YES	X
3	Somabhai D. Vasva	3	1	TH	0.8	0.7	120	14400	5000	YES	YES	211450	NO	X
4	Ambalal Iswarbhai	6	1	TH	1	9.4	10.64	50000	0	YES	NO	251750	NO	X
5	Chandubhai S Makwana	10	3	TH	0.1	4.1	1.463	64000	36000	YES	NO	15100	YES	X
6	Ambalal H. Chauhan	5	1	TH	0.2	4.8	4.375	36000	0	YES	NO	52850	YES	X
7	Shantaben U Solanki	6	2	TH	0.5	3.3	14.55	268000	0	YES	YES	120850	NO	X
Place:-Lilora														
8	Rameshbhai B. Patel	11	2	TH	0.6	5.1	12.16	47000	72000	YES	YES	156080	YES	X
9	Bhajibhai Z. Patel	8	1	TH	0.8	14.19	5.708	50000	0	YES	YES	203900	NO	X
Place Panchdevia														
10	Balwant F. Parmar	2	1	TH	0.2	3.4	4.412	20000	0	YES	NO	37750	YES	X
11	Ramankumar Dahyabhai	5	1	TH	0.8	11.8	6.441	95000	0	YES	YES	191324	NO	X
12	Vijay Amarsinh Chavda	6	1	TH	0.1	2.3	5.652	70000	8400	YES	NO	32727	YES	X
13	Bharatsing M. Parmar	10	2	TH	0.1	11.82	0.677	129000	53000	YES	NO	20100	YES	X
14	Dolatsinh Ramsin Parmar	4	1	TH	0.2	2.6	7.692	12000	0	YES	NO	50350	NO	X
15	Indrasingh C. Parmar	9	2	TH	0.4	1.8	19.44	50000	7200	YES	NO	88100	NO	X
16	Mangalbhai R. Sadhu	7	1	TH	0.9	8.3	10.72	70000	0	YES	YES	224050	YES	X
17	Bharat Singh Magan Bhai	11	3	TH	1.5	3.2	46.88	80,000	0	YES	YES	70000	NO	X
Place:Khandewadi														
18	Chaghan Mujibhai Jadhav	1	1	TH	0.9	2.4	37.08	21000	0	YES	YES	448100	NO	X
19	Kashiben Chandubhai Jadhav	10	2	TH	0.6	4.17	14.15	20000	21000	YES	YES	297050	YES	X
20	Indubhai Karsanbhai	6	1	TH	0.4	3.4	10.59	10000	5000	YES	YES	181250	YES	X
21	Veehandana bhai	7	1	TH	0.6	1.6	34.38	30000		YES	YES	NO	NO	X
22	Ranchod Rai Ji	12	3	TH	0.4	1.8	22.22			YES	NO	NO	NO	X
23	Laxman Singh	6	1	TH	0.1	4.2	2.429	6000		YES	NO	17500	NO	X
24	Rajendra	6	1	Sua	NTH				House	NO	NO	NO	NO	X
25	Bhugilal Bhailal	6	1	Suatter					36000		Y	5000	NO	X
26	Yasim Bhai	9	2	TH	0.2	2.8	8.571		108000	YES	Y	33000	NO	X
27	Bharat Bhai	7	1	Kiosk					72000		Y	5000	NO	X

F S =Fully Size, E M =Earning members,Cat =category (Title Holder/Non-Title Holder),LALA=Land after land acquisition,L L =Land Loss.
 Agri I =Agriculture Income,Comp total=compensation Total

Appendix F: The Summary of the Responses Taken by the PAP's in SKRP

S.No	Name of the PAP	F.S.	E.M.	Cat.	Agri.I. Rs.	Other I. Rs.	T.I.	Loss Type L. T. B.	Comp total	S.W.C.	Option for Resttlement L for L	Position in the Society After LA Imp Dec Stat	
Place:-Rasdhan/Rajpur/Sikandra/Kanpur Dehat													
1	Lakhan Singh	6	1	Sq.	14,200	1800	16,000		Y	53125	Y		
2	Abdul vakeel	11	3	Sq.	0	15800	15,800		Y		Y		
3	Abdul Salam	9	1	Sq.	0		0		Y	44290	Y		
4	Jalil Ahmad	7	1	Sq.	0	16000	16,000		Y	74881	Y		
5	Anant Ram Savita	4	1	Sq.	0	14,400	14,400		Y	35455	Y		
6	Anwar	9	2	Sq.	0	11400	11,400		Y	35864	Y		
7	Ram Sanjevan	5	1	Sq.	0	15120	15,120		Y	30610	Y		
8	Navi Mohammad	5	1	Sq.	0	10950	10,950		Y	40870	Y		
9	Sagirul Hasan	7	1	Sq.	0	14400	14,400		Y	Y		
10	Ashok Kumar	7	1	Sq.	0	15480	15,480		Y	47076	Y		
Place:-Barajod/Akbarpur/Kanpur Dehat													
11	Ram Swaroop yadav	11	3	Sq.	0	24000	24000		Y				
12	Brijesh kumar	4	1	Sq.	0	18000	18000		Y			
13	Ashok Kumar rajput	5	1	Sq.	0	18000	18000		Y				
14	Dharmendra Singh	8	2	Sq.	0	14000	14000		Y				
15	Nijami	8	1	Sq.	0	36000	36000		Y				
16	Salim	9	2	Sq.	0	24000	24000		Y				
17	Om Prakash Mishra	5	1	Sq.	0	18000	18000		Y				
Place:-Kisan Nagar/Kalyanpur/Kanpur Nagar													
18	Shri Krishna Shah	6	1	Sq.	0	18000	18000		Y				
19	Narendra Kumar	5	2	Sq.	0	14400	14400		Y				
20	R. S Vishwa Karma	3	1	Sq.	800	9000	9800		Y				
21	Jagat Narayan	3	1	Sq.	4000	1800	5800		Y				
22	Bhagwati Singh	10	2	Sq.	5000	8000	13000		Y				
23	Lakhan Singh	4	1	Sq.	0	21600	21600		Y				
Place:- Gardenkheda/Raipur/Kanpur Nagar													
24	Kamal Singh Chandel	6	1	TH (A)	8500	24000	32500	Y		X			
25	Bachini Singh	7	1	TH (A)	8500	0	8500	Y			X		
26	Swami Saran Singh	3	1	TH (A)	2000	12000	14000	Y			X		
												X	

[illegible]

[illegible]

where F S = family Size, EM = Earning Members, Cat= Category of the PAP, Agri I = Agricutural Income PAP, TI= Total Income of the PAP, L=Land, T=Tree, B=Business, SWC= Satsfation with Compensation, Lfor L = land for Land, Empl= Employment, Mon= Monetary, Imp=Improved, De= decreased, St=Static

Appendix: Photographs Showing the Various Aspects Covered by Our Study

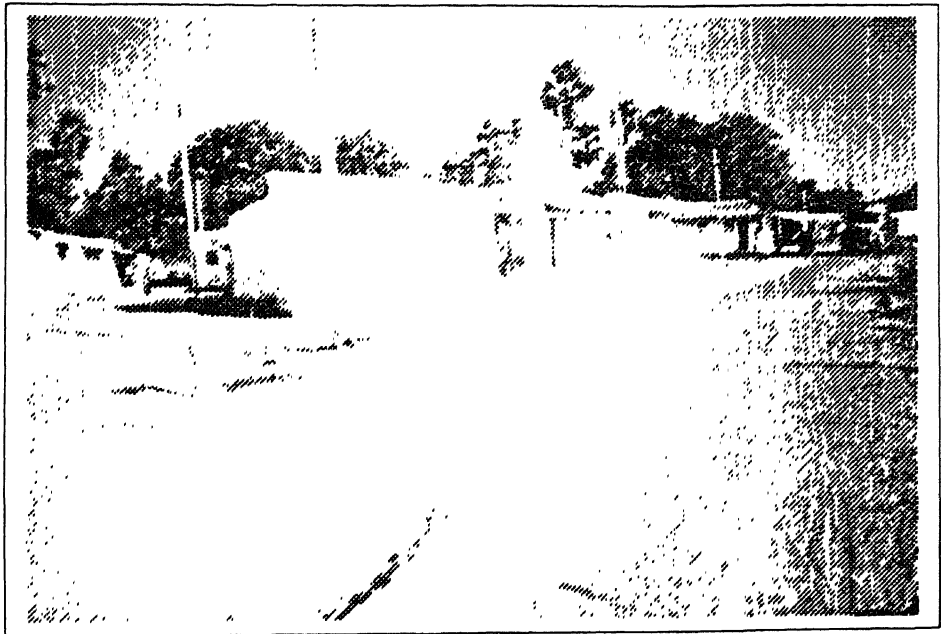


Plate 1. Relocated PAP Colony Khandiwada VHTR Project



Plate-2. Relocated Temple and Some PAP's - VHTR Project

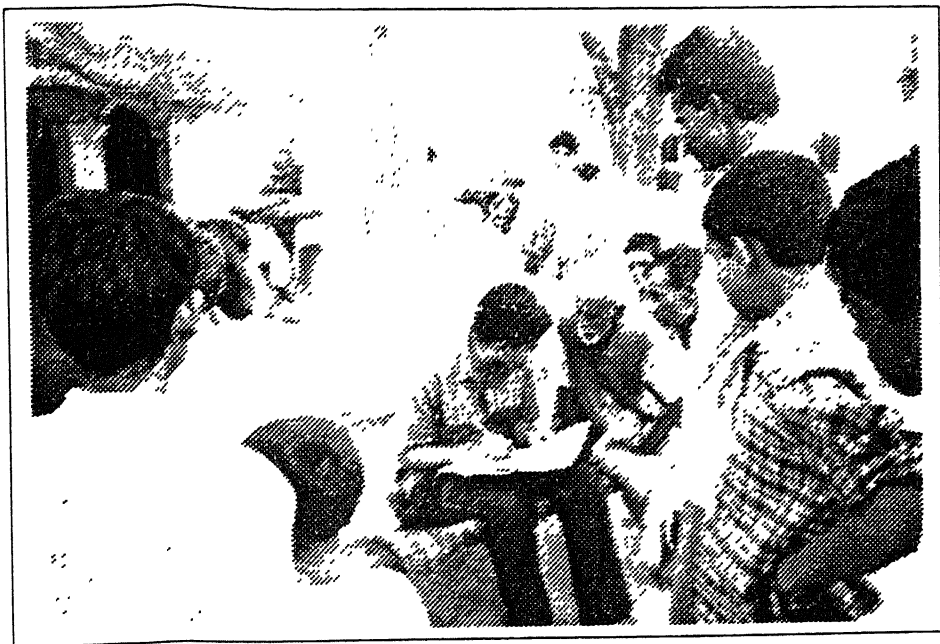


Plate 3. Survey Exercise in Sikandra- Khaga Project

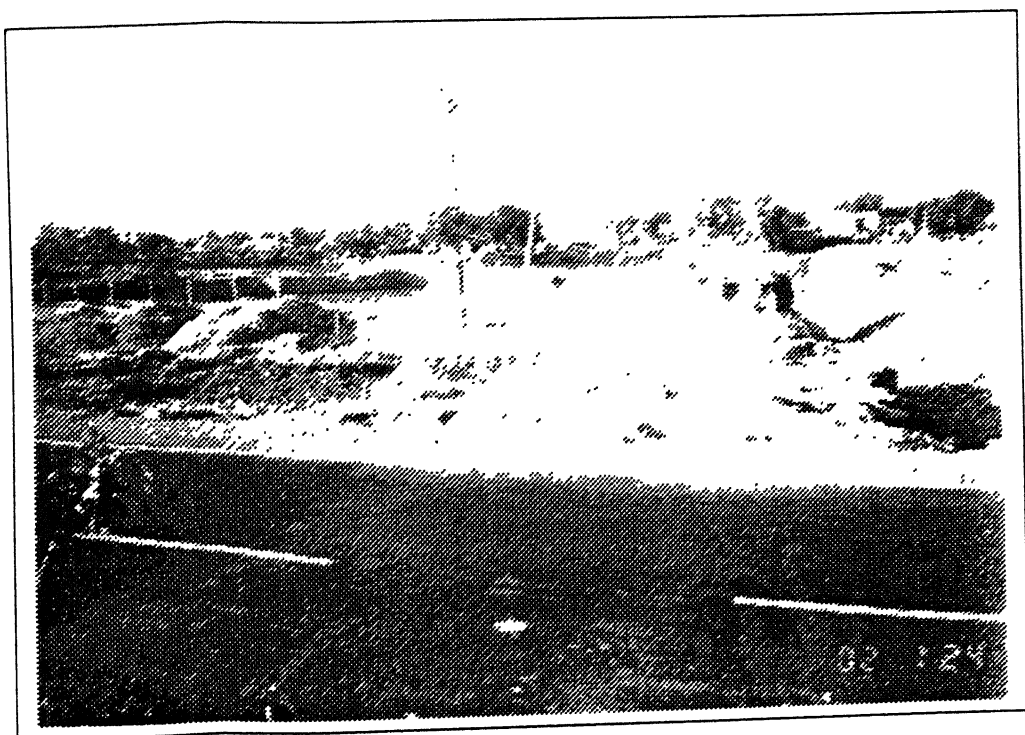


Plate 4. Pond Constructed VHTR Project



Plate 5. Subway Constructed for School children VHTR Project

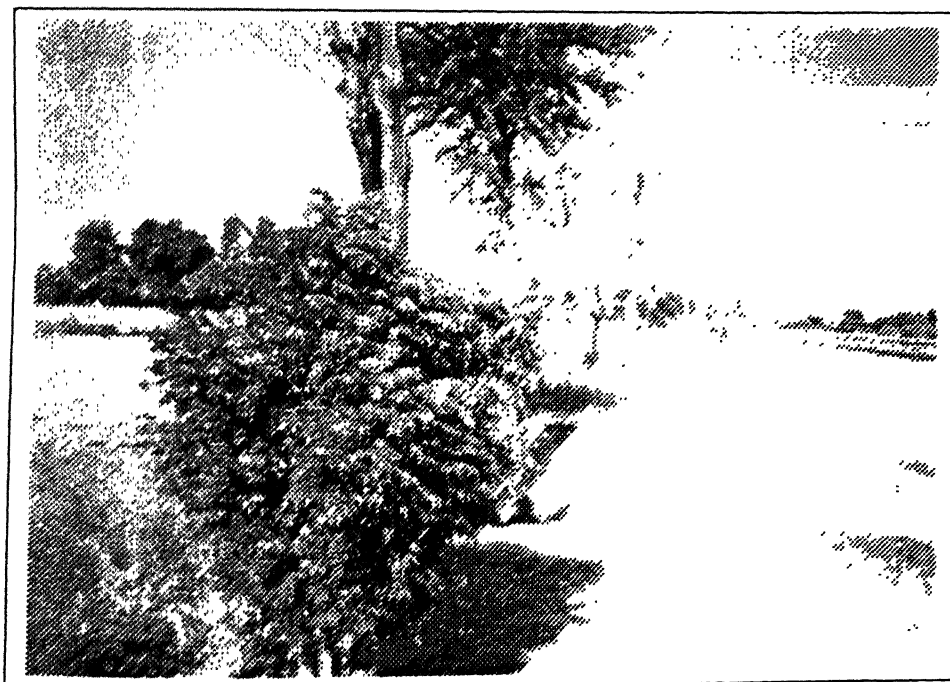


Plate 6. Replanted Trees Which were not Sustained Later (VHTR Project)

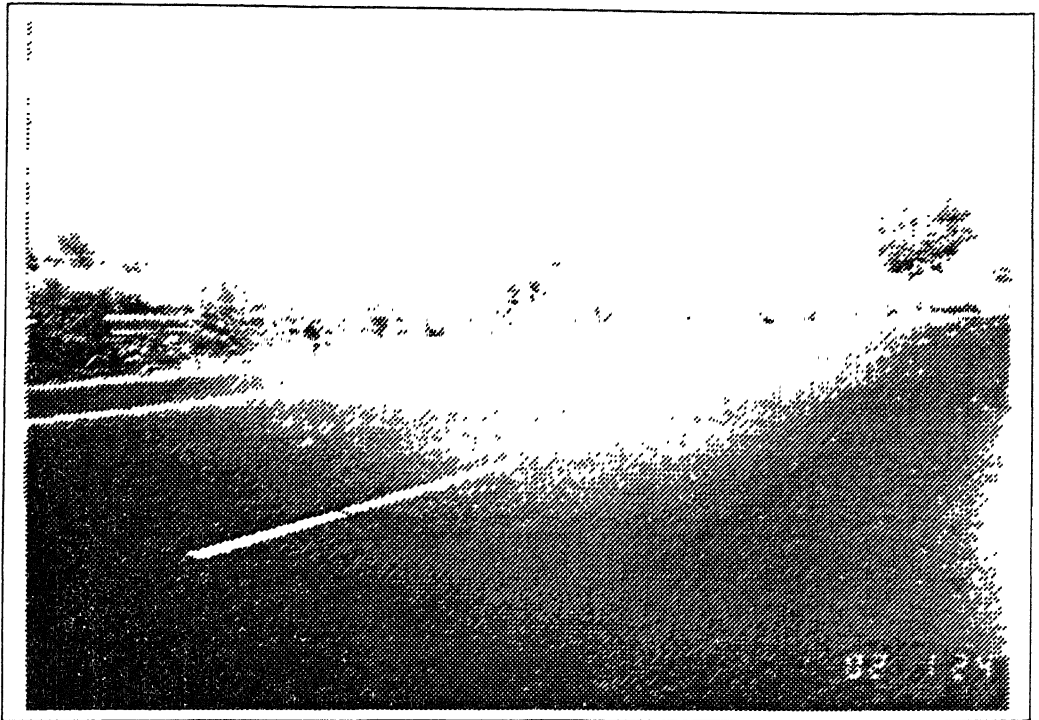


Plate 7. Watering and Care of the Plants (VHTR Project)

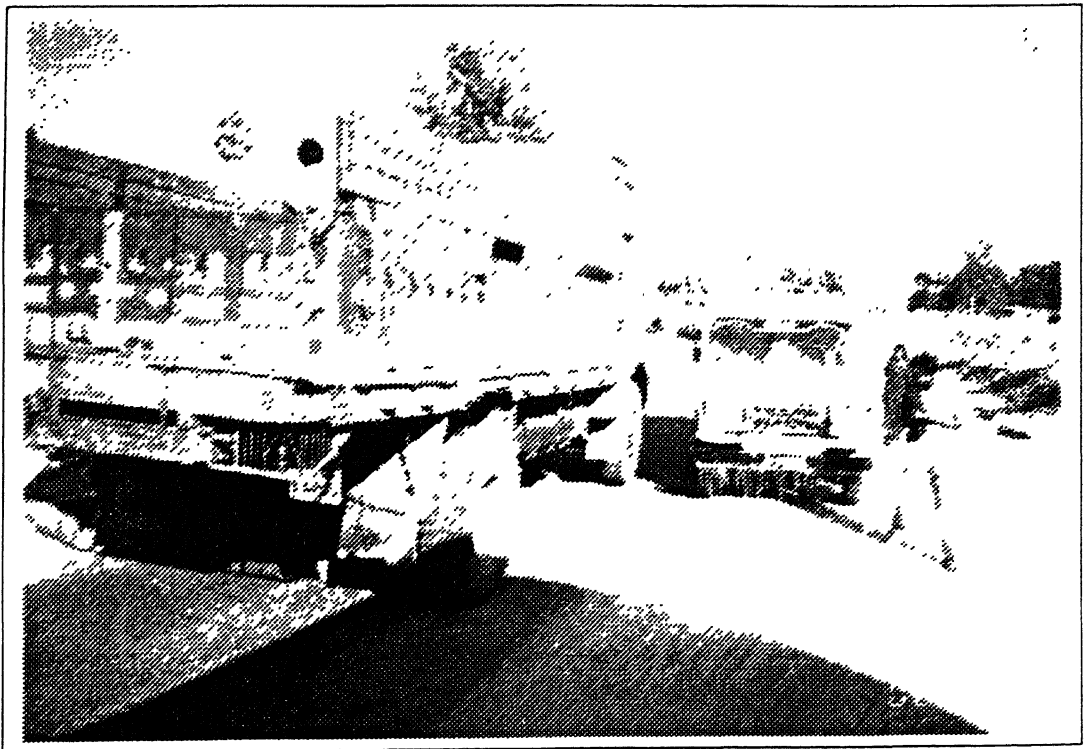


Plate 8. Risk of Accidents Increased (VHTR Project)

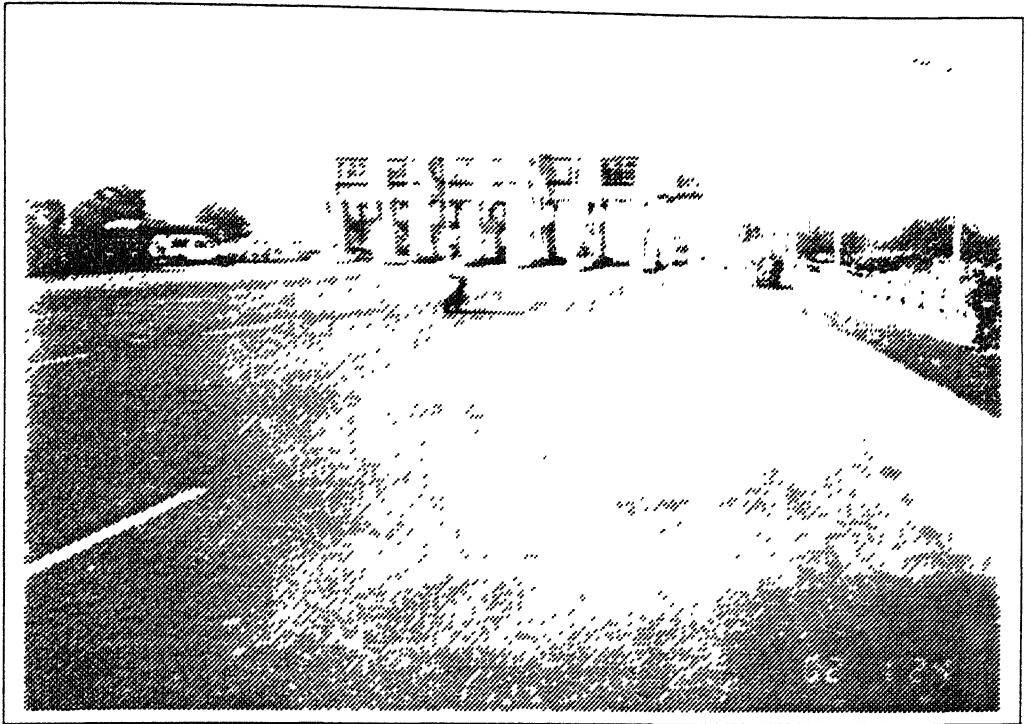


Plate 9. Showing 6-Lane of VHTR with Toll Plaza



Plate 10. Compound Wall for School Constructed by Project Authority (VHTR project)

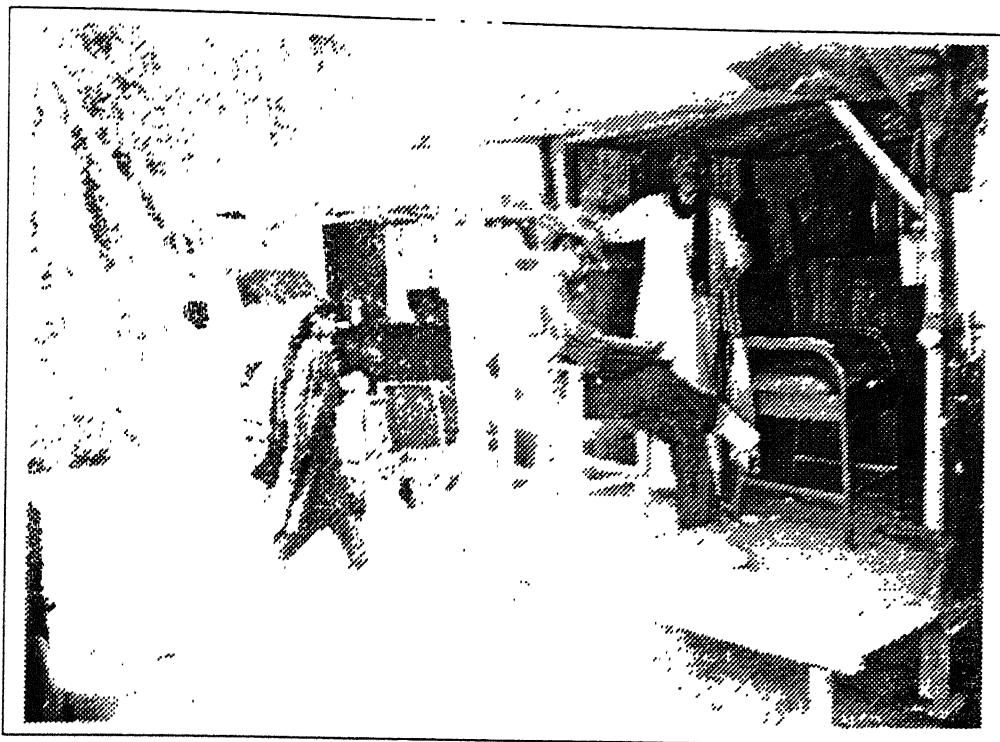


Plate 11. Interviewing a Kiosk in Sikandra- Khaga Project



Plate 12. The construction work in the Sikandra- Khaga project



Plate 13 Borrow area in the Sikandra-Khaga Project

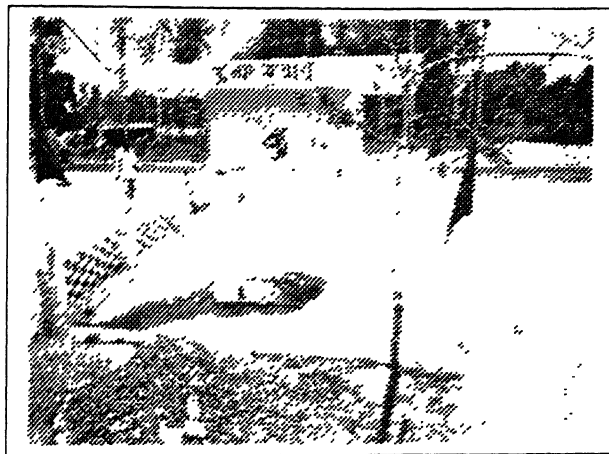


Plate 14. Temples shown which are to be Relocated in SKR Project

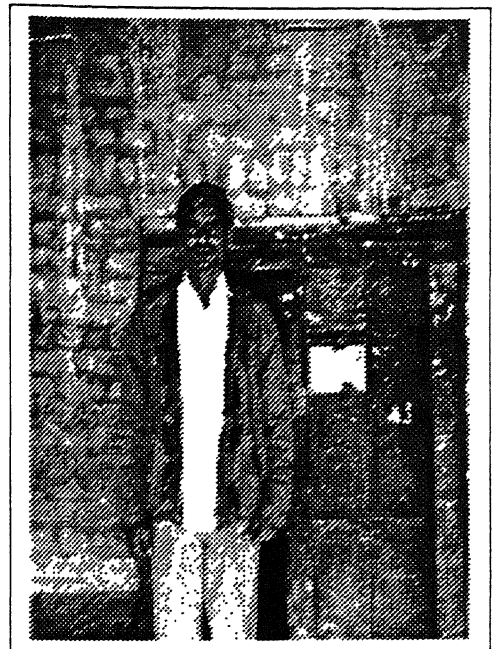
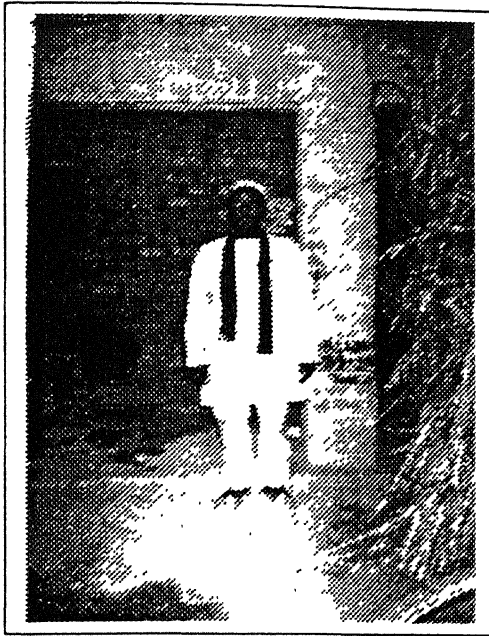


Plate 15

Some PAP's in SKR project

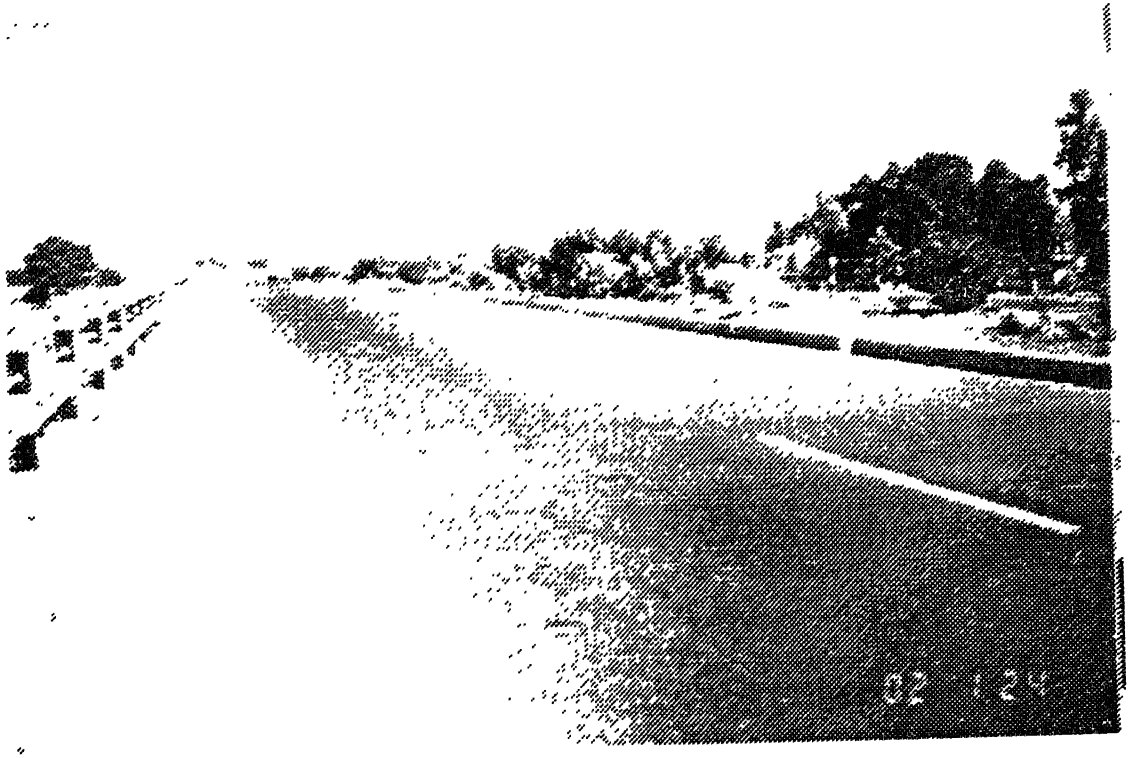


Plate 16 **Well Developed Corridor in VHTR Project**

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